JAN 26 1959

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PIPE LINE INDUSTRY

JANUARY
1959

Gulf Publishing Company, 1959

CONSTRUCTION PROGRESS REPORT

SERIAL RECORD
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PIPE LINE INDUSTRY

CONTENTS and Quick Look

January, 1959 Vol. 10, No. 1

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

CONSTRUCTION PROGRESS REPORT

Contractors' Challenge for 1959

☐ In an exclusive PIPE LINE INDUSTRY interview, R. P. Gregory, president of the Pipe Line Contractors' Association, reports on important association activities during the past year. Special projects now underway promise further advances in sound workable agreements with unions, welder training benefits, simplified specifications, smoother public relations and even wider use of technical advances made in the design and manufacture of pipe line construction equipment. The goal: more miles of top quality line laid for the construction dollar, in spite of increasing labor and material costs... Page 18

25,530 Miles of Pipe to Be Laid in 1959

☐ PIPE LINE INDUSTRY's survey of 233 pipe line companies shows a probable increase of 25 percent in domestic and foreign pipe line construction during 1959. Despite a slow first half in 1958, U.S. activities recovered late in the year with contractors completing 14,982 miles of pipe lines. Forecast for 1959 includes pipe diameters, station horsepower additions, and prime movers to be installed.

By Melvin A. Judah..... Page 24

Technical Advances in High Strength Line Pipe

☐ Research on new high strength line pipe should aid the engineer and the contractor in its application for new lines. TV monitoring and internal longitudinal welds, continuous X-ray inspection of welds, and metallurgical studies are some of the ideas now used at the mill. Field studies of proof testing and failures during pressure tests should provide more answers.

By W. A. Saylor and A. B. Wilder..... Page 26

New Construction and Operating Ideas

☐ Each year brings out new ideas in pipe line engineering and construction . . . and field application proof-tests other ideas. In 1958, important gains were made in welding techniques, pipe protection methods, and submarine construction. Operating lines also continued to make strides in station design and automatic control both for systems and custody transfer.

By John C. Watts..... Page 31

Engineering Twin 55- and 43-inch Lines

☐ Designing a system of twin 55⅜-inch and 43¼-inch pipe lines in a highly congested area presented many problems. Here is a description of the design of scraper launching barrels, drips and overhead spans on the 12¼-mile line. A suspension bridge with a 360-foot section of twin 55-inch lines supported 30 feet above ground on steel towers are two of the unusual features of the world's largest pipe line.

By F. E. Culvern..... Page 37

Hollandsch Diep Crossing Completed

☐ Construction on the 6,000-foot Hollandsch Diep, longest crossing on the Rotterdam-Rhine crude line, has been completed. Several rivers, canal and dike crossings presented special engineering and construction problems on the 190-mile, 24-inch line..... Page 43

Trans-Canada Completes World's Longest Pipe Line

☐ Contractors solved difficult problems in crossing more than 300 miles of solid rock, muskeg and rivers on the final 848 miles of 30-inch pipe to complete Trans-Canada's gas line ahead of schedule.

By Donald G. DePugh..... Page 44

Rugged Terrain Makes Pemex Line Difficult

☐ Petroleos Mexicanos encountered swamps, rivers, mountains and rocky terrain in constructing Mexico's longest pipe line—a 500-mile gas line from Pemex to Mexico City.

By M. Saint Albans..... Page 47

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Part 2 of "Computer Aids for the Pipe Line Engineer" by T. R. Young will appear in the February issue of PIPE LINE INDUSTRY.

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Gas decision helps everyone

The way has been cleared for the continued expansion of the U.S. natural gas industry. Supreme Court reversal of the so-called Memphis decision will have great stabilizing influence, dispelling the uncertainty which has hung over the gas industry since November, 1957.

This action overturns a lower court ruling that customers must give their consent to higher prices in advance of Federal Power Commission approval of rates increases. Thus, the Supreme Court upheld the long established FPC practice in regard to application for rate increases.

This returns operating conditions to a workable basis. It will put new vitality in the gas industry. The industry now knows how it must conduct its business, and can go ahead with plans to provide expanded services to consumers. Everybody will gain from the decision.

Business reality demands that suppliers, in this case natural gas companies, be permitted reasonable price increases whenever faced with rising costs and the necessity of making large investments to provide new and expanded services.

A dangerous trend in business thinking has been reversed by the court's ruling. Customers want bargains. Personal selfishness makes it impossible for them to take a realistic look at costs and prices. This made it uncertain whether gas transmission companies could look forward to much chance at reasonable profits. Profit is a necessity in any business, particularly in expanding industries like gas. Without profit, any business will stagnate.

Now that this dark cloud has been swept away, the U.S. natural gas industry can continue the phenomenal growth which has characterized its activities since World War II. Subject to refund if FPC approval is not obtained, gas suppliers again can put higher rates into effect without waiting for the outcome of long drawn out rate proceedings, some of which require years.

Gas companies have a far better chance of obtaining necessary rates to recover high cost investments. Freeing of the commission and pipe line companies from an ill-reasoned lower court decision means a step-up in natural gas pipe line construction. It is impossible to say how much new construction has been delayed by the Memphis decision, but it has been considerable. Some of these expansion plans now will be carried forward to completion.

The real beneficiaries are the consumers of gas. Continued expansion of the industry will provide increased supplies. Consumers can look forward to adequate supplies of gas being made available for their use.

Gas still is by far the cleanest, most convenient, and the cheapest of all burning fuels, and undoubtedly will remain so. More of the U.S. population now will have a chance to be supplied with this marvelous fuel.

Had the decision stood, stagnation of the industry would have lead to short supplies. In time, customers would have found themselves forced to bid against consumers in other areas. This would have lead to higher prices than will exist under present operating conditions.

The decision does not mean runaway consumer prices, as some have implied. Transmission companies cannot increase prices automatically whenever they wish. The public continues to be protected by the Natural Gas Act, which requires that all rate increases be approved by the FPC. The FPC always has required that the need for higher prices be substantiated with facts that prove the necessity.

The FPC needs to attack the backlog of applications for rate increases with all the speed possible, now that it can do so with confidence its ruling will be effective.

To do so, the FPC is likely to need to increase its staff. This additional personnel should be added as soon as the commission can obtain the necessary funds from Congress.

If your pipe line zigs when you expect it to zag,

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There are many occasions in pipe line construction when plans must be changed on the spot. In such an event, you need have no worry about where to get the valves, fittings and other parts to fit the new plan. They are as close as your "Oilwell" representative.

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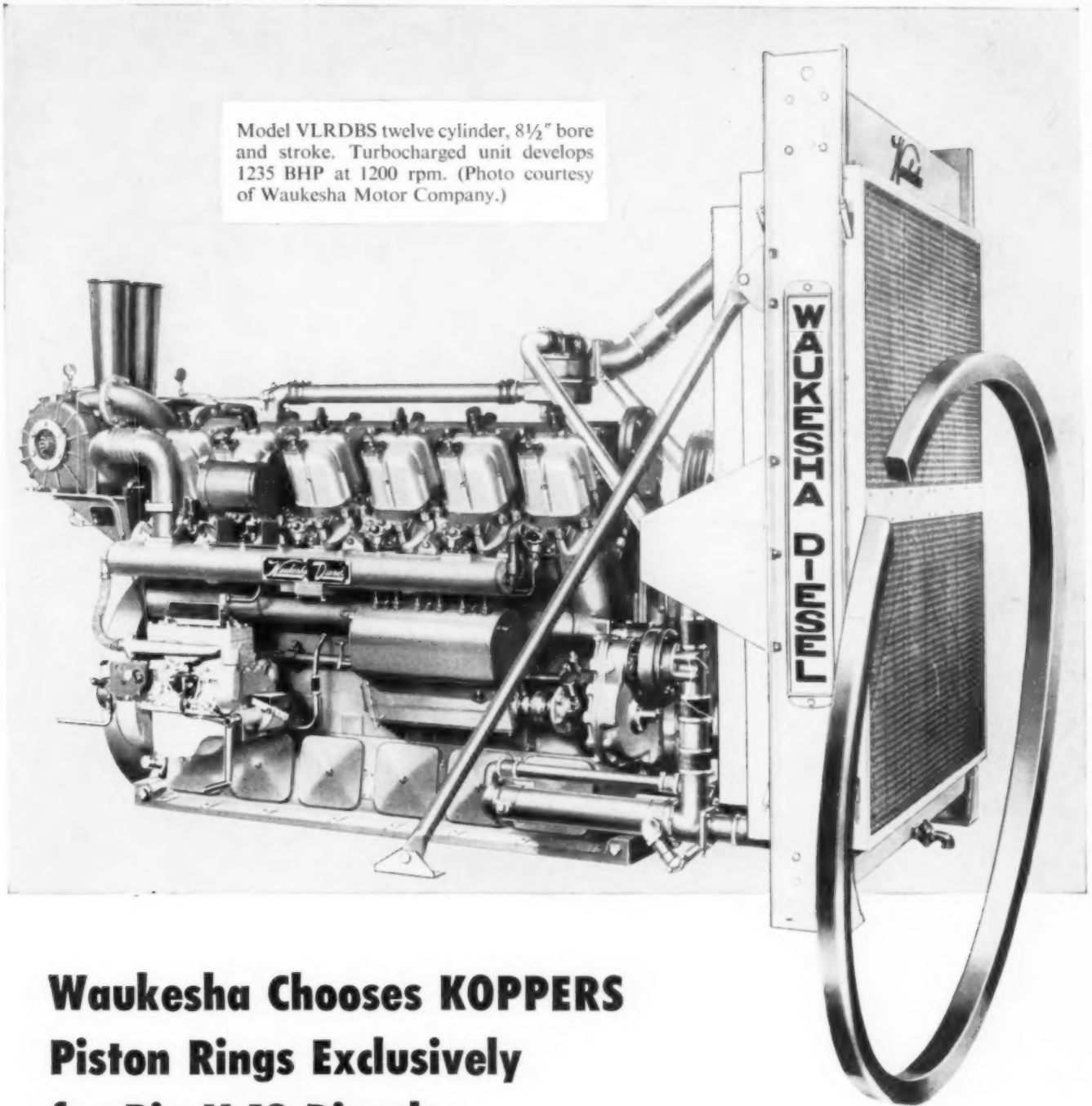

Model VLRDBS twelve cylinder, 8½" bore and stroke. Turbocharged unit develops 1235 BHP at 1200 rpm. (Photo courtesy of Waukesha Motor Company.)

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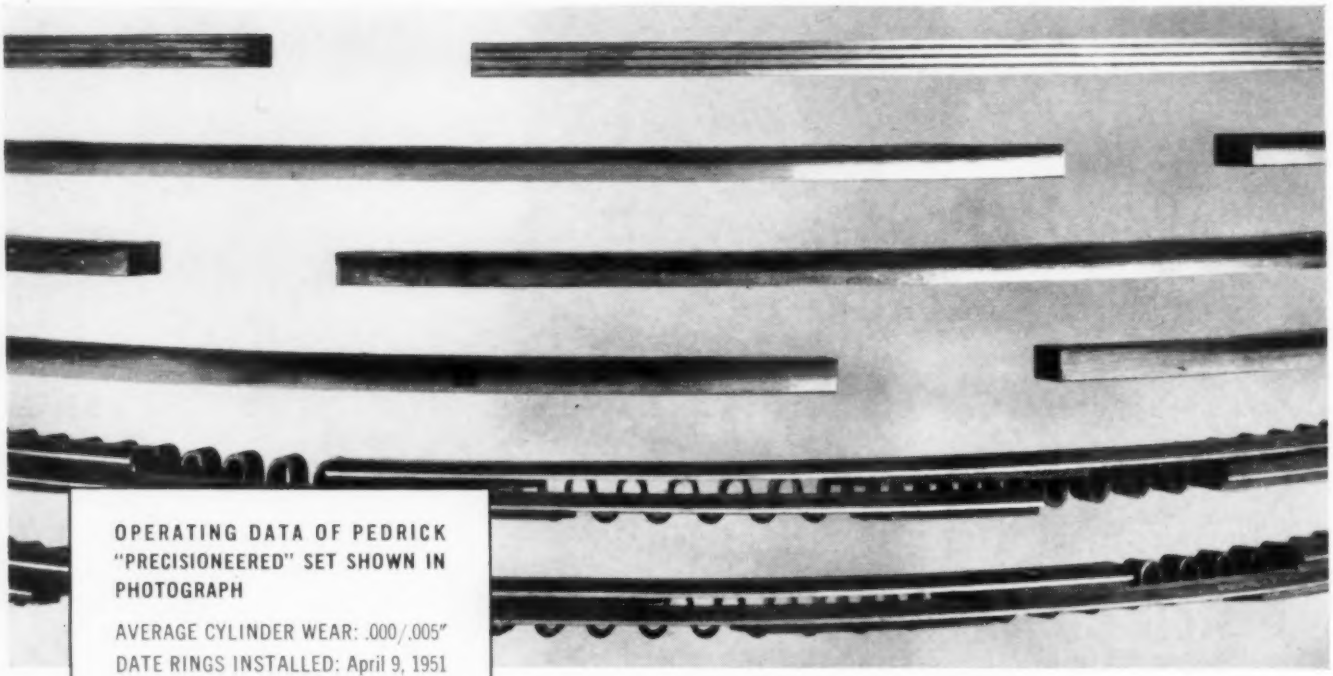
. . . an average of 6,350 h.p. hrs. per gal. total lube oil consumption.

The photograph shows Pedrick Piston Rings removed from a Cooper-Bessemer GMVTF 10 cylinder engine after 40,622 hours of operation. Note carefully how the face-wear on the rings (the bright area) extends only half way up. After more than six years of *full load* service, these Pedrick rings are practically as good as new.



OPERATING DATA OF PEDRICK "PRECISIONEERED" SET SHOWN IN PHOTOGRAPH

AVERAGE CYLINDER WEAR: .000/.005"
DATE RINGS INSTALLED: April 9, 1951
DATE RINGS REMOVED: June 27, 1957
TYPE LUBE OIL: DTE No. 3 MAGNOLIA
RATED HORSEPOWER: 1100
MAXIMUM OVERLOAD: 10%
LUBE OIL CONSUMPTION: CRANKCASE—39,600 H.P. Hours per Gal. LUBRICATORS—(14 qts. per day) 7,530 H.P. Hours per Gal.
TOTAL LUBE OIL CONSUMPTION (CRANKCASE AND LUBRICATORS): 6,350 H.P. Hours per Gal.

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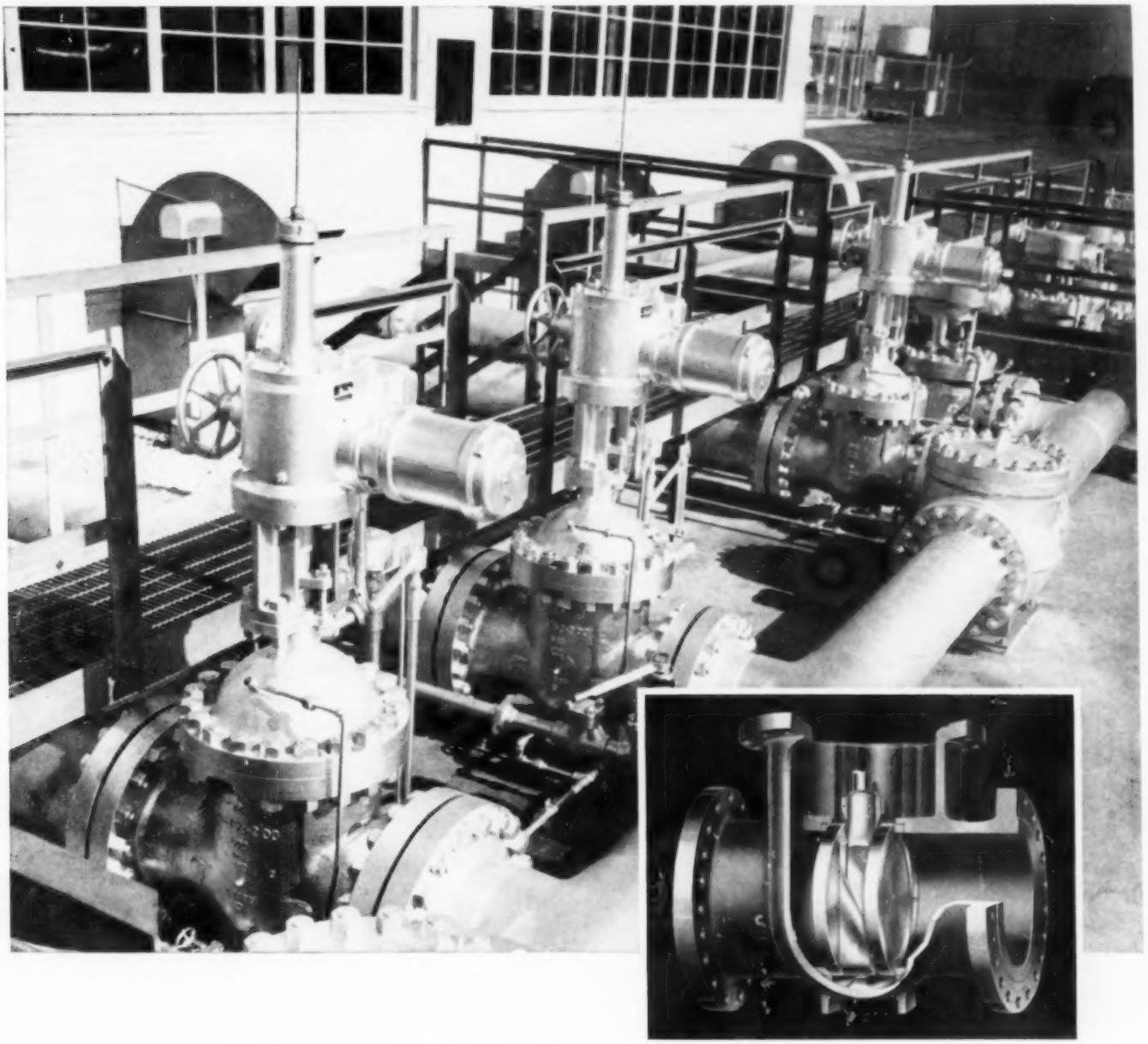

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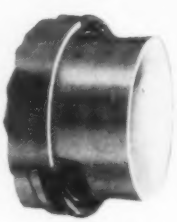

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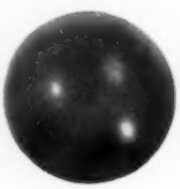

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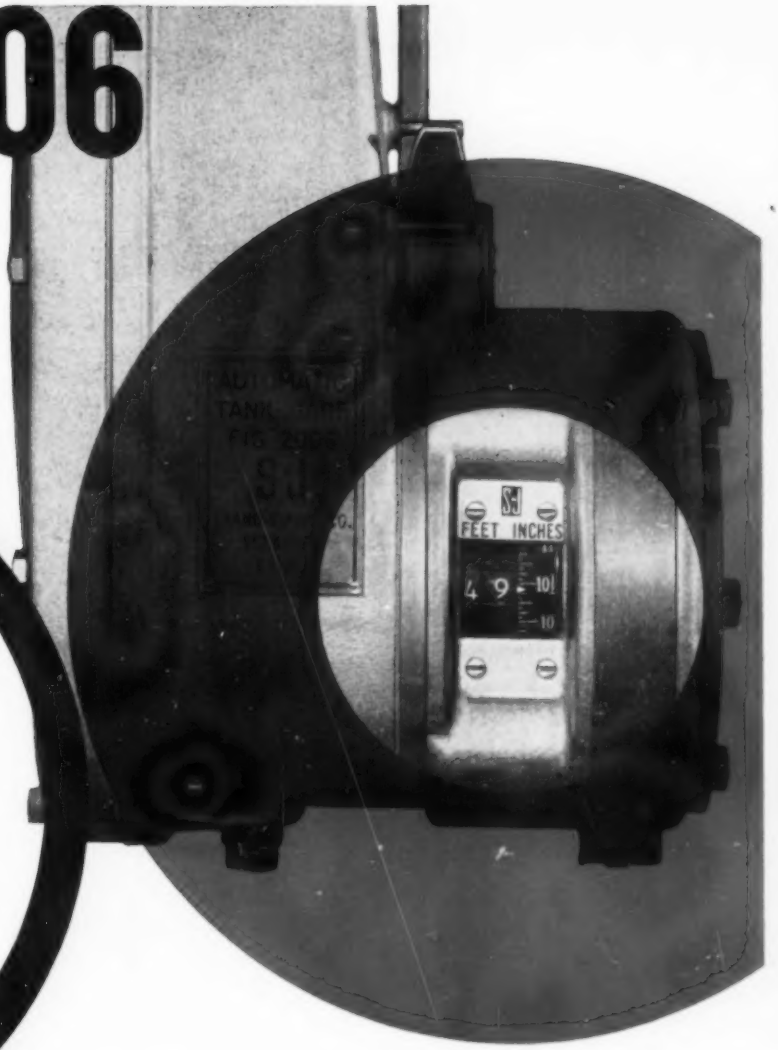

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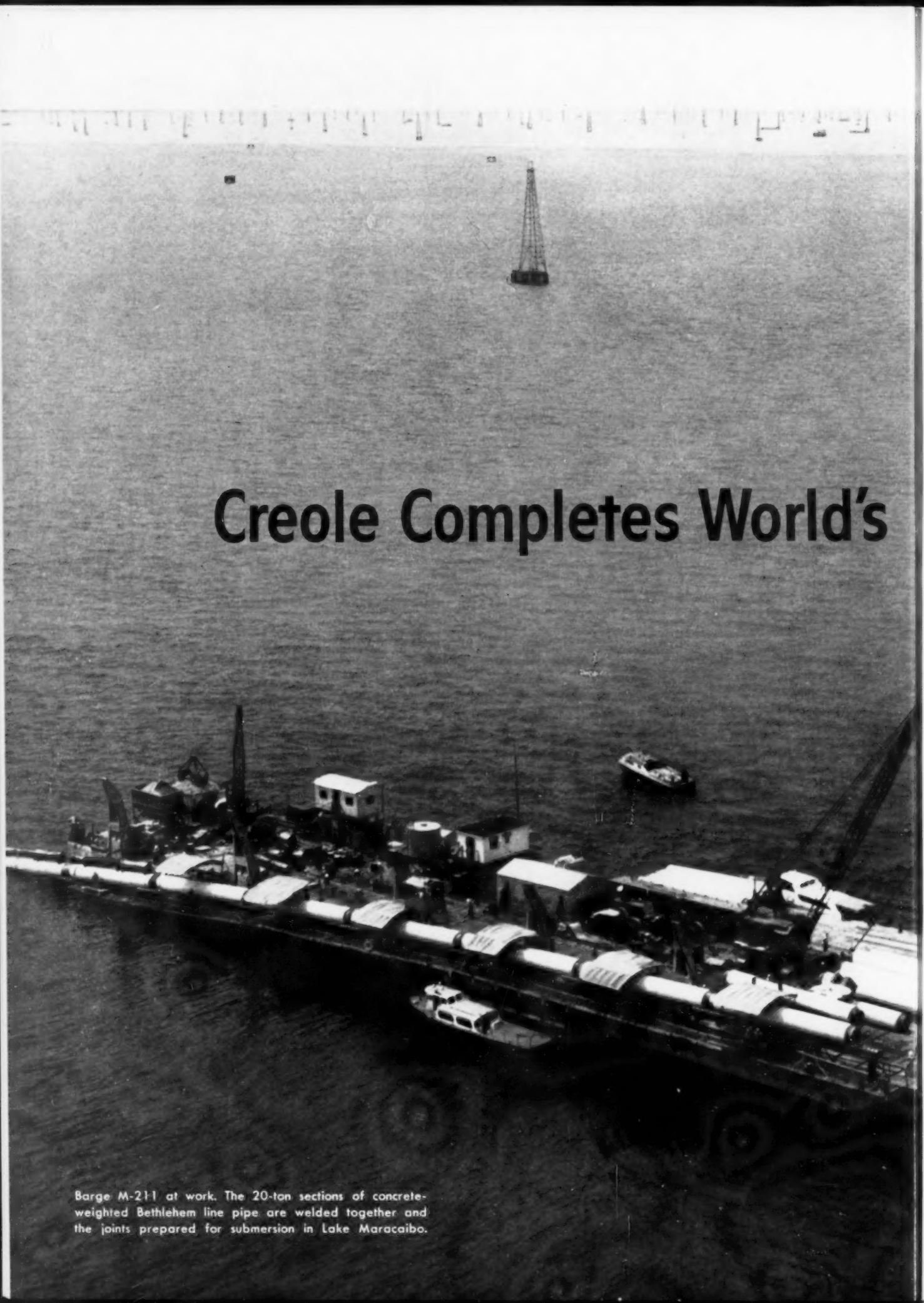
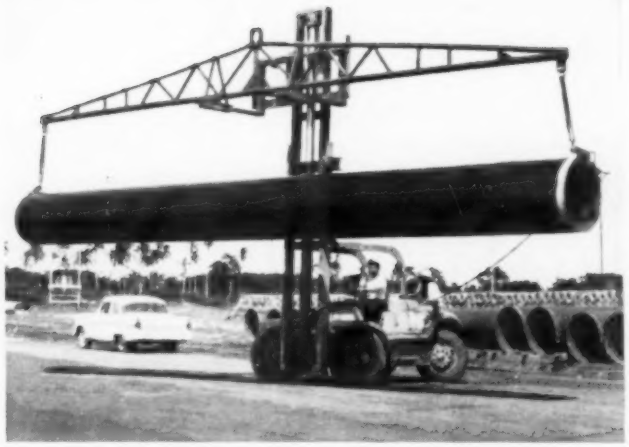


Barge M-211 at work. The 20-ton sections of concrete-weighted Bethlehem line pipe are welded together and the joints prepared for submersion in Lake Maracaibo.



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BETHLEHEM STEEL

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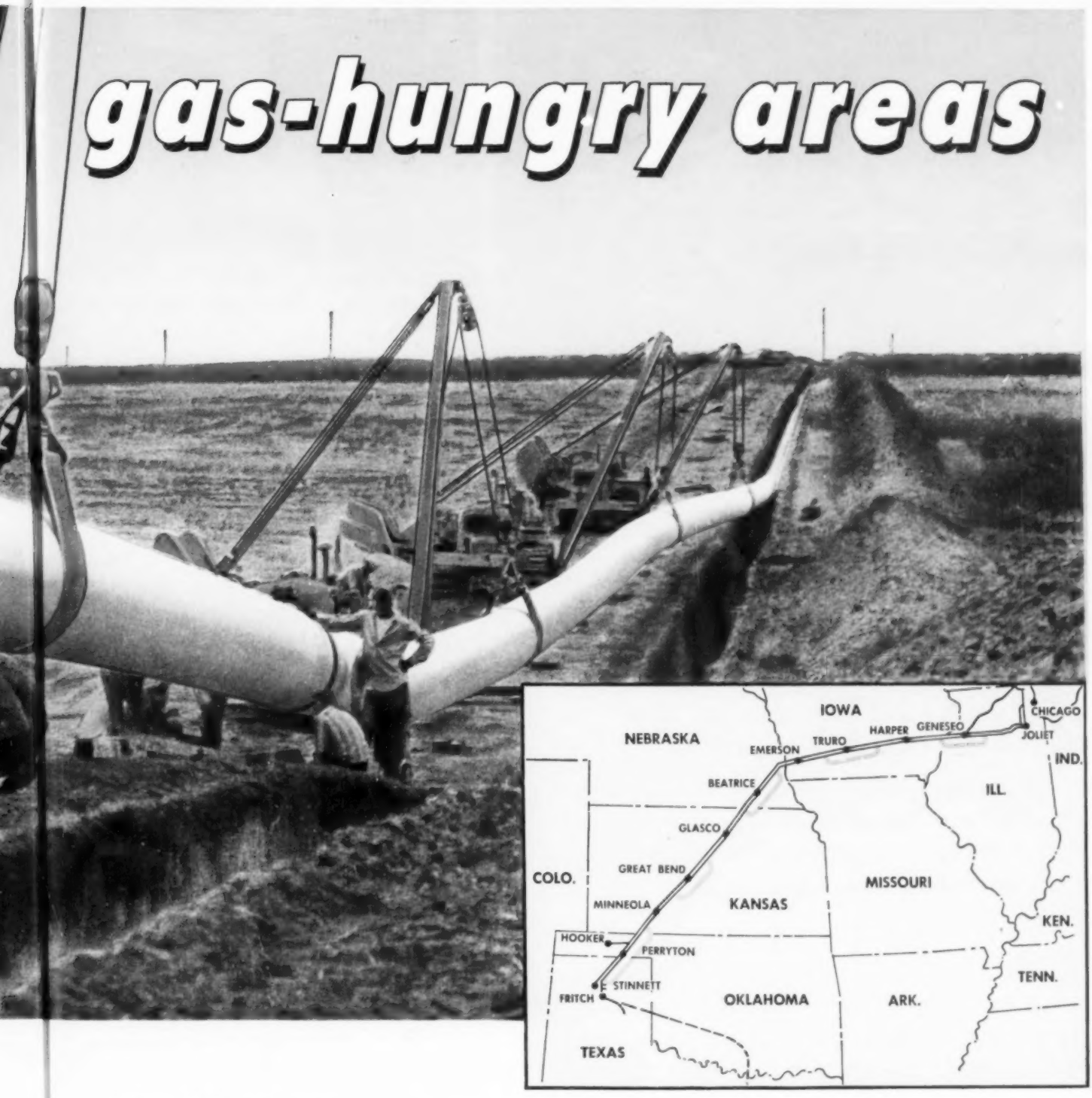
gas-hungry areas



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A. O. Smith line pipe has always been manufactured to a high standard of quality . . . precisely controlled at every step of production. That's why A. O. Smith pipe made and installed in 1928 is still in operation. That's why so much A. O. Smith pipe has been used on so many important pipeline projects.

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A pipeliner's view of a recently completed remote controlled compressor station built by GPCC in Andrews County, Texas.

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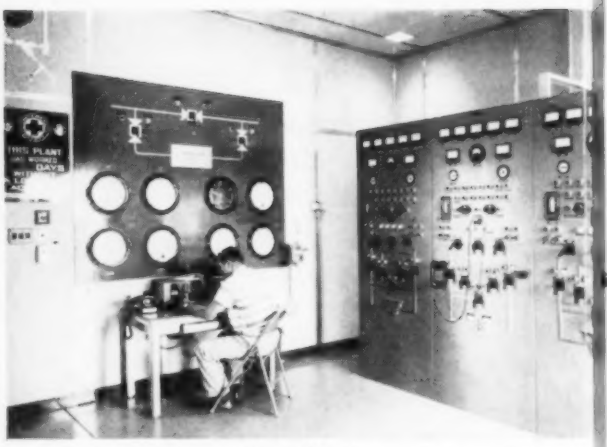
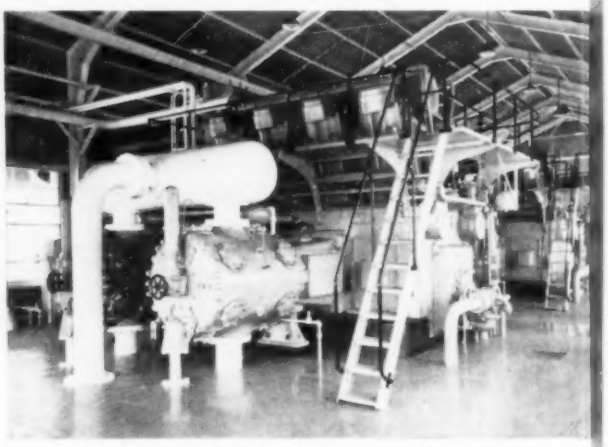
ESPERSON BUILDING • HOUSTON, TEXAS



Control room, engineered by GPCC for remote controlled operation.



Compressor building designed to allow for efficient operation and maintenance.

GPCC engineering service includes the design and construction of all station auxiliary systems.

Complete station piping fabrication is included in GPCC's design and engineering service.

PIPE LINE PANORAMA

Memphis Reversal Brightens '59 Outlook . . . After 14 months of confusion, economic instability and shelved expansion plans, natural gas pipe line companies can now resume "normal" operations that existed before November, 1957 lower court decision in Memphis Case. Recent U.S. Government survey shows natural gas pipe lines will increase capital expenditures about $500 million at start of '59 from mid-'58 level. **F.P.C. reports more than half** of natural gas rate increase cases now on the docket have been hanging fire since Memphis Decision. However, Commission is now making up for lost time in disposing of court-delayed rulings. One older rate case is almost settled; Colorado Interstate has agreed with wholesale customers to rebate $38.5 million in FPC-rejected rate increases. Wholesalers will in turn refund consumers in their respective areas.

First Completely Automatic Double Jointer . . . In addition to eliminating manual welding on double joints, Bechtel's new device requires no internal welds. Features of new method: Welding is done externally in two passes as pipe is rotated—no tack-weld nor stringer bead necessary—new line-up clamp that completely covers inside circumference of pipe—floating heads on welding machine to insure constant metal deposit—dogleg compensator provides fixed gap and evenly rotates pipe with bends or doglegs.

Replies to Borden Commission Muddle . . . Canadian Petroleum Association has urged its national government to beware of imposing "excessive regulation" on Canada's energy resources industries as implied in Borden Report. Association President John W. Proctor says any delay of current applications for gas export pipe lines would have serious adverse effect on industry's '59 budgets—would reduce country's employment at critical time—and could result in loss of currently available gas markets.

Trans-Canada Pipe Lines Director N. E. Tanner has issued similar statements, adding that Canada, with more than enough gas to meet foreseeable needs, could benefit greatly from exports.

Meanwhile, Alberta Oil and Gas Conservation Board met during first week of January to begin hearings on revised applications to export Alberta natural gas to U.S. markets. Companies involved are Alberta and Southern Gas, Westcoast Transmission and Trans-Canada.

Test Plastic Pipe for Offshore Use . . . Shell Oil and English manufacturer have laid 900 feet of 3-inch plastic pipe wrapped in steel tape and insulating materials in 35 feet of water, near Plaquemine's Parish, Louisiana—in 30 minutes. Although cost is tightly held secret, Shell spokesmen report plastic pipe does not have to be weighted to ocean floor, weighs 12.2 lb. per foot (heavier than steel) and can handle 2,000 psi.

Advantages: Can be laid in deep water without heavy equipment—flexibility allows safe drop to ocean floor without stressing and makes pipe less vulnerable to waves, currents and changes in ocean floor—can be laid faster and with much less effort than conventional small diameter pipe.

New Products for Pipe Lines . . . Continental Oil has successfully test-shipped 2,250 barrels of dodecene 500 miles through Cherokee line from Ponca City, Oklahoma to Wood River, Illinois. Plans are to ship 20,000 barrels of product through the line several times a year, with expected loss of only .2 percent in interface. Look for other petrochemical products to be shipped just as successfully in near future.

An Interview with PLCA President R. P. Gregory . . .

"Cost reduction has been achieved mainly by more efficient methods and use of new equipment. A lot of credit goes to the fine job done by manufacturers, service companies and suppliers."

Contractors' Challenge for 1959

During the past year, pipe line contractors made important advances in:

- **Improved public and labor relations**
- **Holding costs down despite rising prices and wages**
- **More efficient contracting operations**

Major goal for 1959: Even greater advances in these three vital areas, through closer industry cooperation

When the Pipe Line Contractors Association meets this month in Bal Harbour, Florida, it will mark 11 years of joint effort among the country's leading contractors toward advancing pipe line construction.

These efforts have produced important results. Cost of laying pipe lines has been held down despite increases in labor, equipment and material costs. Perhaps the most significant advances the contractors have made through cooperative efforts have been in smoother relations with the public and owner companies, reasonable working agreements between contractors and unions and more efficient operation through use of specialized equipment developed by manufacturers and service companies.

Benefits to owner companies have been more miles of larger diameter pipe laid at a minimum cost, plus safer working conditions and a well managed stable pipe line construction industry.

All of this has been accomplished despite the problems of handling larger sizes of pipe, regulatory uncertainties and right-of-way problems.

To size up the record for 1958 and spotlight the aims for 1959, Pipe Line Industry's editor interviewed R. P. Gregory, president of the Pipe Line Contractors Association.

Q *What are some of the problems facing pipe line contractors next year?*

A Contractors, as well as owner companies, are naturally interested in reducing the cost of constructing pipe lines and at the same time maintaining operating capabilities and safety records for the owner company. The record of the pipe line construction industry has been particularly good in keeping the cost of constructing lines at a minimum, in spite of continuing increases in cost of equipment, materials and labor. There have been many reasons for this. A lot of credit goes to the owner company, to the pipe line construction equipment manufacturers and service organizations, to contractor management throughout the industry and also to the better trained labor force being developed in the pipe line construction industry.

Q *Specifically what are some of the steps that have been taken by the contractors in reducing costs?*

A Cost reduction has been achieved mainly by more efficient methods. Contractors have used virtually every type of new equipment which manufacturers have devised to cut cost and increase daily construction progress. Here we would certainly have to give credit to the excellent job done by manufacturers, service companies and suppliers in their development of equipment and methods to handle larger pipe, specialized coatings and the problems encountered in various types of terrain through which lines have to be laid.

Contractors have taken advantage of these advances by keeping their equipment fleet modern; also, suppliers have helped to cut costs by warehousing services, which

"Owner companies are becoming more and more conscious of the difficulties and added burdens placed upon contractors by unnecessarily restrictive clauses in specifications."

has reduced the surplus of materials and waste which often plagued the contractors in the past.

More and better training of contractor personnel with emphasis on the top qualities of leadership and supervision also have paid off. Most contractors now use somewhat more supervisory personnel on a cross-country spread than they would have three years ago. This has resulted in smaller turnover and a more efficient group of employes.

We have a greater number of personnel with the contracting companies the year around so we are insured from year to year of having a good work force.

Public relations is another subject getting attention of contractors as well as owner companies. Close relationship with land owners, civil authorities, pipe line owner companies and the public in general have given the construction industry a better name and cut down on damages and other difficulties encountered in laying cross-country pipe lines. Various steps to improve communications between contractors and these groups have paid off in a better understanding through magazines, news releases and the cooperative work done by the Pipe Line Contractors Association.

Safety emphasis during constructing, testing and all phases of operations has gone along with the technical advances and personnel upgrading.

The end results of all these advances have been increased daily progress for the dollar spent. This is a remarkable achievement in the face of generally rising costs and increasing technical problems in pipe line laying in general.

Q *What are some of the ways the PLCA has helped contractors and pipe line companies, too?*

A Probably the most important work undertaken this past year by the Pipe Line Contractors Association has been the setting up of the welders training school. Some 50 graduates have been integrated into the pipe line construction industry as welders. Another 60 have been working in spreads, but not as welders. In general, we feel that this school has made a substantial contribution in helping to fill the needs for more highly qualified pipe line welders.

Important progress was made by the labor negotiations committee in working out agreements with unions that were generally well received by all contractors and unions, too. Recognizing some of the recent concern over possible violations of the Taft-Hartley law, in regard to hiring policies with the unions, contractors plan to take a really close look into this phase of union-contractor relationships to make sure that all laws are being adhered to.

Q *Will there be a welding school in 1959?*

A Yes. The association is cooperating with the United Association of Journeymen, Pipe Fitters and Welders in maintaining a permanent training school for welders in Tulsa. This continuous school will train 75 men per year and will take the place of a "crash" welding school as set up during the past year.

In this connection the joint school with the unions in Tulsa is an important result of the generally good working arrangements that pipe line contractors and unions have established during the last few years.

Q *What are some of the important developments contractors are working on in welding?*

A A special committee on investigation of automatic welding processes is taking a look at several automatic welding methods. One significant development in the field of automatic welding has been the German magnetic belt method which I believe you reported in November, 1958. Other automatic welding developments have also been studied with the goal of improving the quality of field welds and increasing daily construction progress by being able to weld under more difficult conditions and to take some of the physical strain and fatigue off the welder.

Since many of the automatic welding methods under study require just about as many men to operate the welding machines as the number of welders you normally would have on a spread, cost advantages will have to be gained by having more uniformly high quality welds, and by being able to weld under practically any field condition. Although the association is watching various automatic welding schemes with interest, we do not at present have a coordinated action in developing automatic welding.

Q *What has been the contractor's experience with laying the new high strength pipe on lines this past year?*

A In general it has been good. Of course, we all recognize owner companies are naturally interested in reducing cost by designing better pipe lines. One way to do this is the use of high strength pipe to withstand higher

operating pressures for the amount of steel used in a given line.

Contractors have laid substantial quantities of API LX-56 line pipe in 1958 and have met the normal specifications. Previous normal specifications were for X-52 line pipe. The difference in carbon and manganese content of the steels has presented a few problems in the field. The LX-56 is a little harder to bend in the field and also has given a little bit more difficulty in welding. It requires greater care in line-up to prevent the fracture of the stringer bead and requires greater skill from the welder in the realm of finer detail. Methods and procedures are generally the same, but it does require more care in stringer bead and on the final cap. Contractors generally agree that welders have adapted well to this new problem.

Q *Several companies have applied tapes and other coatings externally on pipe and in some cases also for internal protection. What in general has been the contractors reaction to these special type coatings?*

A Contractors are anxious to get a chance to apply new coatings when specified by the owner companies. Recent coating developments in polyethylene and polyvinyl tapes have made it easier in most terrain and in some cases easier and cheaper to coat the pipe line. Here again, credit goes to the pipe line equipment manufacturers and suppliers for developing the machinery to handle the tapes and new thin film coal tar blends.

Quite often, the first time a contractor hears that such a coating is to be used on a line is when he sees the specifications for construction and it is neccessary for him to rely on the equipment suppliers for the equipment to put the coatings on right.

Q *Has there been much of a problem with contractors in regard to testing and specifications for lines in accordance with the pressure piping code?*

A Hydrostatic testing of the large diameter pipe lines is more expensive to contractors. However, the contractors generally feel that the code for pressure piping is a step in the right direction because it provides a uniform method of testing and construction. This prevents having a different specification tossed to a contractor on each job. Now contractors know what they are bidding on, what the problems are going to be in advance and can plan accordingly.

Owner companies are becoming more and more conscious of the difficulties and added burdens placed on contractors by unnecessary restrictive clauses in specifications. Of course, here again the contractor's reputation for ability to perform high quality work is an asset.

This year the Pipe Line Contractors Association has initiated, by committee action, work in clarifying and simplifying work specifications among various owner companies. These are not set up as ways to cut corners in construction, but the end result should be a completed pipe line that is just as good or better at a lower cost. At the same time, such specifications would enable contractors to know ahead of time exactly what they are facing when they bid.

Q *Have there been any especially difficult problems for the contractors during the past year?*

A One of the contractor's largest cost items still is moving heavy equipment from one location to another. This is a particularly difficult problem when it involves crossing state lines. In some states it is practically impossible to move equipment by truck; and railroad transportation may not always be the complete answer. Contractors do recognize that state authorities have the responsibility to look over roads; however, in some cases the restrictions put on contractors make it virtually impossible to move heavy pipe line construction equipment by truck. Where possible, it is often most economical to move by water.

Q *Recent surveys have indicated growing pipe line activity outside the United States. Do you anticipate greater interest of domestic contractors in overseas work?*

A Foreign pipe line activity is one of the big question marks for American contractors. A certain number of pipe line contractors are active in work outside the United States. There was a great deal of activity in Canada during this past year, much of it the result of the completion of the Trans-Canada main line. Probably most of the work scheduled overseas will be handled by those contractors already active in foreign work.

Overseas work requires large investments in equipment, shipping materials, supplies, spare parts and super-

"Most main line contractors have been very busy during the last half of 1958; 1959 is expected to be generally active because of continuation of several major projects and some held up, pending FPC action."

vision and training of inexperienced personnel. Contractors already overseas are in a much better position to handle them and to lay pipe lines at competitive costs. Overseas pipe line construction work does not appear to be as attractive in the next few years as it was several years ago. It is often difficult for a contractor to get the general construction contract.

Another growing problem in overseas work will probably be that much serviceable pipe line construction equipment will be in those countries after completion of current projects and these will lead toward organization of native contractors who will grow into the work.

Q *What are your thoughts regarding the future of pipe line construction work in the United States, particularly in view of the Memphis Decision reversal by the Supreme Court?*

A Activities will be largely centered on more and more miles of main line pipe line construction. Much of this work will be looping of big inch cross-country gas transmission lines. There will probably not be any major increase in pipe sizes in the next few years. From what contractors know and what we hear from owner companies, our guess would be that most future looping projects will be of 30- 36-inch pipe for cross-country lines except those for very special cases.

However, should the need arise for larger diameter lines of special material and special construction methods, contractors feel confident that they will be able to build them. Equipment manufacturers can build the high performance machinery to do the job.

Q *What is the outlook for pipe line construction mileage in 1959?*

A To answer this, it might be well to summarize the way activities went in 1958. The first five months were very dull with little work on main line systems and the last seven months were quite active. Most main line contractors have been very busy during this latter period.

1959 is expected to be generally active because of a continuation of several of the major projects and some that had been held up pending FPC action.

For example: This will be the first year that several contractors intend to work through the winter months. The impact of the Memphis Decision is behind us; this should further increase activities.

The Midwest and West Coast still present very active markets. There may be a possibility of one or two new lines to each area with continuing expansion on existing lines to East Coast markets.

Q *What are some of the plans for the Pipe Line Contractors Association for the coming year?*

A First the continuing work of the various committees that we have mentioned before are going a long way toward better relationship with the owner companies, equipment manufacturers, labor and the general public.

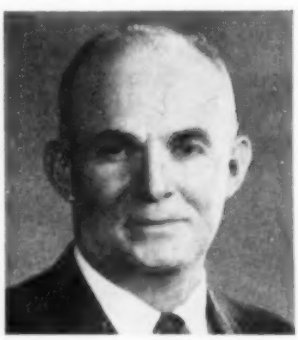
This past year the association held two special working meetings to handle business in advance of the annual meeting: A meeting of the board of directors in March and a special called meeting the first week in October in St. Louis handled much of the important business that accumulated between annual meetings. Our program for the annual meeting in Florida will give attention to many of these matters, too.

Pipe Line Contractors Association Leaders

OFFICERS AND DIRECTORS of the Pipe Line Contractors Association who have led its activities in the past year are: President R. P. Gregory, Houston Contracting Company; John H. Williams, Williams Brothers Company, first vice-president; James W. Sharman, Sharman, Allen, Gay, and Taylor, second vice president; E. G. Morrison, Western Pipe Line, Inc., treasurer; Richard A. Gump, executive secretary, and Hailey A. Roberts, assistant to the executive secretary.

Other directors now serving actively include: C. C. Bledsoe, Midwestern Constructors, Inc.; O. R. Burden, O. R. Burden Construction Corp.; R. A. Conyes, Conyes Construction Corporation; T. A. Hester, Oklahoma Contracting Company; Felix M. Johnson, Trojan Construction Company; James P. Neill, J. P. Neill & Company; H. C. Price, H. C. Price Company, and R. B. Somerville, Somerville Construction Company.

OFFICERS



R. P. Gregory

John H. Williams

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DIRECTORS

C. Clark Bledsoe

O. R. Burden

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Program

Pipe Line Contractors Association,
Americana Hotel, Bal Harbour, Fla.
January 12-15, 1958

Sunday, January 11

6:00 p.m.—President's cocktail party for officers, directors and honored guests—President's Suite

Monday, January 12

7:30 a.m.—Early Birds Breakfast—Bal Masque & Medallion Rooms. Courtesy Insley Manufacturing Corporation, Indianapolis, Ind.

9:00 a.m.—Board of Directors' Meeting—Pan American Room

11:00 a.m.—A Day at the Races—Tropical Park Race Track. Courtesy M. J. Crose Manufacturing Company, Tulsa, Houston, Denver, Newark & Edmonton

6:30 p.m.—Cocktails—Starlite Patio. Courtesy Perrault Equipment Company, Tulsa

8:00 p.m.—Hawaiian Luau Party—Poolside (weather permitting; otherwise Grand Ballroom). Courtesy H & L Tooth Company, Montebello, Calif.

Tuesday, January 13

9:30 a.m.—General Business Session—Medallion Room

12:00 noon—Luncheon for the Ladies—Surf Club, Miami Beach. Courtesy Allis-Chalmers Manufacturing Company, Milwaukee

12:00 noon—Cocktails and Luncheon for the Men—Bal Masque Room. Courtesy Big Three Welding Equipment Company, Houston

2:00 p.m.—Gin Rummy Tournament begins—Floridian Room. Sponsored by Polyken Sales, Division The Kendall Company, Chicago

6:00 p.m.—Cocktails and Buffet Dinner—Grand Ballroom. Courtesy Caterpillar Tractor Company, Peoria, Ill.

Wednesday, January 14

9:30 a.m.—General business session—Grand Ballroom

11:00 a.m.—Closed business session for regular members only—Grand Ballroom

12:00 noon—Luncheon and style show—Bal Masque & Medallion Rooms. Courtesy Crutcher-Rolfs-Cummings, Inc., Houston

3:00 p.m.—Gin rummy tournament continues — Floridian Room

6:00 p.m.—Cocktails—Grand Ballroom. Courtesy International Harvester Company, Chicago

7:30 p.m.—Annual Banquet and Floor Show—Grand Ballroom

Thursday, January 15

8:00 a.m.—Breakfast meeting of Board of Directors—Pan American Room

10.00 a.m.—Meeting of regular members only — Westward Room (for discussion of labor matters)

Speakers who will address the general business sessions, Tuesday and Wednesday are:

Albert A. Morey, Marsh & McLennan, Chicago: Insurance in Contracting Operations, Trends in Court Decisions

L. W. A. Campbell, Tennessee Gas Transmission Company, Houston: Development of a Gas Transmission System

R. G. Strong, Natural Gas Pipeline Company of America, Chicago: New Pipe Line Steels

Tom S. Johnston, President, Interprovincial Pipe Line Company, Toronto: Canadian Oil Industry Developments

Jerome Fenton, General Counsel, National Labor Relations Board, Washington: Hiring Practices in the Construction Industry

PIPE LINE INDUSTRY's Annual Survey Reports . . .

25,530 Miles to Be Laid in 1959

Reports from 172 U.S. companies and 61 international pipe line operators forecast a 25 percent increase in Free World construction activity

By Melvin A. Judah
Editor, PIPE LINE INDUSTRY

DESPITE A slowdown in construction activities early in 1958—resulting from the impact of the Memphis Decision, regulatory bottlenecks and a general tightening down in the oil industry—recovery was healthy enough in the last seven months of the year to bring the total mileage of new line completed nearly up to the level of a good 1957.

U. S. pipe line construction snapped back to a total of 14,982 miles on the strength of this last half surge. Effect of the Supreme Court's reversal of the Memphis Decision was too late to have any marked influence on 1958 work; however, adjustment by the gas transmission industry to the overshadowing cloud permitted completion of several major system expansions. Over-all effect of the Supreme Court's action should be favorable to a healthy gas industry, but most industry observers don't anticipate a sharp recovery that would be the reverse of the drop of a year ago.

In the light of this favorable regulatory mood, 172 U.S. pipe line operators told PIPE LINE INDUSTRY that they were planning construction of

Forecast of Free World Pipe Line Construction Activity During 1959
(All Figures Represent Miles of Line Laid During Year)

	UNITED STATES		FREE WORLD OUTSIDE U.S.		TOTAL FREE WORLD	
	1958	1959	1958	1959	1958	1959
NATURAL GAS LINES:						
Transmission Lines	6,877	9,950	2,185	2,257	9,062	12,207
Gathering Lines	3,436	3,501	652	1,381	4,088	4,882
Total Gas Lines	**10,313**	**13,451**	**2,837**	**3,638**	**13,150**	**17,089**
CRUDE OIL LINES:						
Trunk Lines	2,007	965	1,499	2,908	3,506	3,873
Gathering Lines	1,320	1,045	1,311	1,061	2,631	2,106
Total Crude Lines	**3,327**	**2,010**	**2,810**	**3,969**	**6,137**	**5,979**
PRODUCT LINES (Including LPG):						
Total Product Lines (Including Main and Laterals)	**1,342**	**1,170**	**793**	**1,292**	**2,135**	**2,462**
TOTAL ALL LINES	**14,982**	**16,631**	**6,440**	**8,899**	**21,422**	**25,530**

Forecast of Prime Mover Horsepower to Be Installed By Free World Pipe Lines During 1959

	UNITED STATES		FREE WORLD OUTSIDE U.S.		TOTAL FREE WORLD	
	1958	1959	1958	1959	1958	1959
COMPRESSOR DRIVES:						
Gas Engine	415,955	504,742	.....	.....	.....	.....
Gas Turbine	95,000	110,100	.....	.....	.....	.....
Electric Motor	72,700	55,600	.....	.....	.....	.....
Total Compressor	**583,655**	**670,442**	**106,335**	**105,450**	**689,990**	**775,892**
PUMP DRIVES (Crude and Products):						
Electric Motor	121,660	50,225	.....	.....	.....	.....
Gas and Diesel Engines, and Gas Turbines	16,055	11,000	.....	.....	.....	.....
Total Pump	**137,715**	**61,225**	**23,629**	**28,050**	**161,344**	**89,275**
GRAND TOTAL	**721,370**	**731,667**	**129,964**	**133,500**	**851,334**	**865,167**

16,631 miles of line and 731,667 horsepower additions to their systems in 1959.

Record year of pipe line construction was in 1954 when 17,745 miles of line was laid in the U.S.

Station construction will continue at a high level in 1959; horsepower additions of 731,667 forecast for 1959 will be up slightly over a near record 721,370 horsepower built in 1958. Foreign station work will show an increase in 1959, too; from 129,964 up to an estimated 133,500 horsepower.

Gas Lines Up, Liquid Lines Drop. The PIPE LINE INDUSTRY survey shows a continuing generally healthy outlook for the gas transmission industry as contrasted with a significant drop in crude oil and products line construction. A total of 13,451 miles of gas transmission and gathering lines is planned for 1959; up sharply over 1958's 10,313 miles. Crude oil trunk and gathering systems, however, are expected to be down to 2,010 in 1959 from a total of 3,327 completed in 1958. Products line work will show a drop, too, from 1,342 in 1958 down to an estimated 1,170 in 1959.

Free World Work to Continue High. Reports from 61 operators of pipe lines outside of the United States show a continuing high level of construction activity. Plans call for construction of 8,899 miles of pipe line in 1959 as compared with 6,440 miles completed in 1958. Gas transmission and gathering systems comprise 3,638 miles of this total; crude oil trunk and gathering lines, 3,969 miles, and products and LPG lines an estimated 1,292 miles.

Station additions of 133,500 horsepower on systems outside of the United States is forecast for 1959. This is a slight increase over a near record 129,964 horsepower in 1958.

All Major Companies Polled. Forecast figures are based on PIPE LINE INDUSTRY's survey of all major pipe line companies in the United States and abroad. The survey asked in addition to mileage figures, the diameter of lines and station additions.

The 172 companies who operate the bulk of the U.S. pipe line system mileage were included in the summary. Virtually every major company responded. They told PIPE LINE INDUSTRY, in confidence, how many miles of lines they laid in 1958, sizes of pipe, station horsepower installed, type prime mover and plans for 1959.

Also included in the report is an estimate of the activity for a few companies who did not report, but who had previously announced completion of projects in 1958 or plans for 1959.

This survey does not include distribution lines laid within corporate city limits, conversion of lines from one service to another, or reconditioned line mileage.

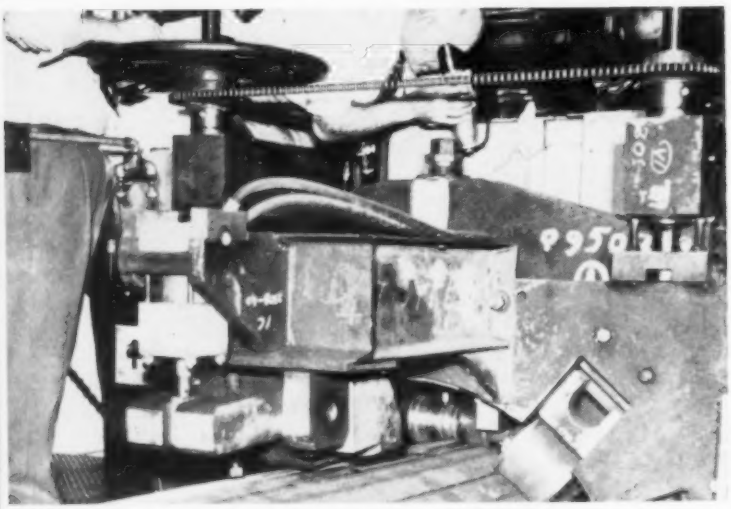
Forecasts cover lines and stations actually completed during 1958 and forecasts of work scheduled for 1959, not the mileage placed in service. Portions of line already completed but possibly not in service are included in the 1958 figures; sections scheduled for completion next year are in the 1959 report.

Forecast of Diameters of Pipe to Be Used in Construction Projects

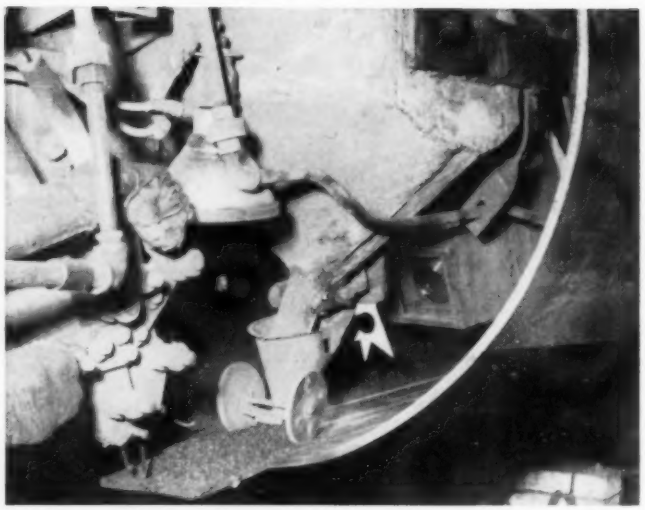
	U.S.		OUTSIDE U.S.	
Nominal Diameter (Inches)	1958	1959	1958	1959
4 and under	2,072	1,985	497	359
6	1,306	1,277	507	593
8	967	974	539	743
10	836	885	548	13
12	1,858	1,863	737	1,290
14	262	378	....	....
16	1,463	1,528	520	889
18	489	476	54	30
20	1,103	935	26	14
22	16	113	....	213
24	1,375	1,627	1,249	1,652
26	406	511	24	....
28	16	13	230	....
30	1,179	1,975	1,198	1,715
32	....	....	35	....
34	538	1,485	93	700
36	799	390	....	600
over 36	25	....	16	6

Total of all diameters not equal to industry total, as some reporting companies did not show breakdown by pipe diameter.

—The End



Induction welded pipe shown as it leaves the machine in experimental setup for production research. It is essential to secure a properly fused weld which may then be slightly upset. Proper control of the process is a critical factor in making a satisfactory weld.



TV camera used at the mill to precisely guide the internal weld. Lines are marked on the surface of the plate after forming at a distance of about 1½-inch from the edge. Welding operator views progress of the weld on a screen and maintains the inside weld exactly at the center of the adjoining edges of plate.

Technical Advances in High Strength Pipe

Use of new high strength steels is increasing in pipe line construction. Research on mill welding methods, metallurgical properties, and field proof testing should lead to a better understanding of their properties

By W. A. Saylor, Consolidated Western Steel Division
United States Steel Corporation, Los Angeles

A. B. Wilder, National Tube Division
United States Steel Corporation, Pittsburgh

DURING THE past decade pipe line design and construction has made important advances. Increased diameters, greater yield strength of pipe, plus improved inherent quality of steels have helped to make better pipelining possible. This combination has contributed to the outstanding growth of the pipe line industry.

Use of reasonably developed and well written specifications have advanced the technology of pipe line construction. The API Std. 5LX was first issued in 1947. Prior to 1950 all manufacturers of large diameter high strength pipe made contractual sales on the basis of special specifications. While these specifications were agreed upon by the purchaser and manufacturer they did not result in a uniform standard for pipe line construction. A need for more uniform regulations for the construction of large diameter gas pipe line was recognized.

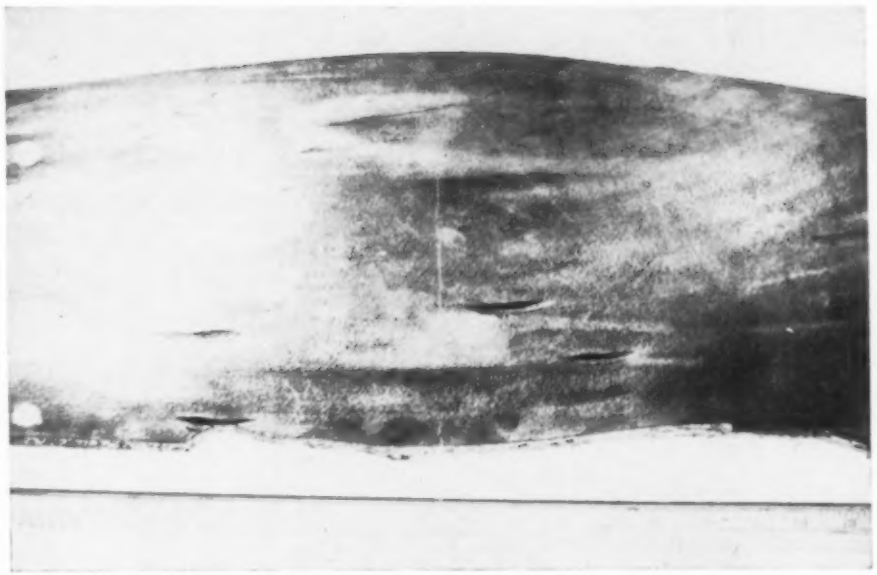
Pipe users and manufacturers, began through the American Petroleum Institute and the American Standards Association, to develop improved standard specifications and design codes. As a result of this effort Section 8 of American Standard Code for Pressure Piping (ASA B31.1) was revised and adopted.

Due to a general desire among the users and designers of pipe lines, a ladle carbon equivalent of .65 maximum (%C + %Mn/4) was incorporated in Section 8 of ASA Code B31.1 for line pipe. The American Petroleum Institute also revised Specification API Std. 5L and API Std. 5LX for line pipe. Pipe manufacturers immediately adopted these revised API standards and the gas industry began to construct transmission pipe lines under the new specifications for line pipe.

Prior to 1945 the majority of line pipe in sizes 20-inch to 26-inch O.D.

was manufactured either by the seamless or flash welding processes. In 1946 double submerged arc welded expanded line pipe was first produced and with it a greater flexibility was achieved in producing larger diameter line pipe.

Increased use of large diameter line pipe necessitated a detailed study of the steel making and pipe manufacturing practices, field construction methods including stringing, welding, ditching, covering and line pipe operating practices. These studies have resulted in better pipe lines and this work is being continued.



Examples of gouges or lacerations that can contribute to pipe line rupture during pressure testing. Cooperative studies now underway between manufacturers and industry groups should reduce this hazard during construction.

Steel Making Practices Affect Pipe Properties. Practically all electric weld line pipe plate is manufactured from semi-killed steel. In the manufacture of seamless pipe a non-hot topped steel is generally used. The present practice has proved over the years to be the most economical and best adaptable practice for these large pipe tonnages. For the larger pipe diameters, wider and longer plates were necessary, as well as greater thicknesses compared with the smaller diameter pipe. Also, it became apparent that due to the cold expanding of the pipe during manufacturing greater care had to be exercised in mold preparation, rolling temperatures and intermediate processing of slabs to provide acceptable plates free of harmful scabs, slivers, seams and with a uniform microstructure.

Pipe Manufacturing Advances. Recently certain pipe mills have installed press forming which results in an improved cylinder from a diameter viewpoint, reducing the occurrence of the flat weld area. Also, the submerged arc method of welding pipe in certain pipe mills has been improved by welding a tab on each end of the pipe. This method provides a uniform automatic weld on the inside and outside of the pipe.

Welding has also been improved by adopting wires and fluxes which result in a weld with properties similar to the plate material. These factors, in addition to a more uniform chemical composition of the pipe plate, have resulted in a better product.

Mill Inspection Methods. All major pipe manufacturers recognize the need for quality in line pipe and many use non-destructive tests in their manufacturing process to maintain pipe quality at a high level. These tests include Magnaflux, dye-penetrant, X-ray, sonic testing, eddy current, macroetch testing, and others. Visual inspection standards are maintained at a high quality level; surface imperfections, gage, and bevels, weld, camber, out-of-roundness, are closely controlled in accordance with specifications.

Pipe Produced From Coiled Steel. Usually large diameter line pipe is manufactured from sheared mill plates. Presently it has been possible to produce API Std. 5LX Grade X52 pipe from coiled plates. Coiled plates are rolled on a modern strip mill and in the coiling operation a "coil annealing effect" is obtained.

To be certain that pipe manufactured from this class of rolled material meets the tensile test requirements of API Specifications it is necessary to employ certain precautions on the hot mill before coiling; if necessary a slightly higher average level of carbon and manganese may be used. It has been possible to satisfactorily produce considerable quantities of 24-inch O.D. Grade X52 line pipe from coiled plate.

At the rolling mill the plate is decoiled, flattened, sheared to size and inspected before shipment to the pipe mill. Extensive tests have been conducted on coiled plate material by selecting and testing critical locations in the coil and correlating these results with the finished pipe properties. These tests have shown the product to be satisfactory; surface condition of coiled plate has been good.

TV Camera Guides Welder. In the production of submerged-arc welded pipe, a new technique has been developed recently to locate more accurately the I.D. weld at the center of the two adjoining edges of the plate being welded. A TV camera, is conveniently located inside the pipe during welding.

Lines are marked on the surface of the plate after forming at about 1½ inches from edge and parallel to the longitudinal edges of the plate. These lines may be used as a reference line during inspection of the I.D. weld to determine if it is properly located.

During inside welding these reference lines are used by the welding operator; viewing them on a TV screen located at the welding controls he maintains the inside weld exactly at the center of the two adjoining edges of the plate being welded.

Induction Welding Research. Two leading manufacturers of pipe have conducted considerable cooperative experimental work in a detailed study of the production of 30-inch O.D. line pipe by the induction welding method.

Here is a long distance rupture that occurred during testing with gas. Further research is needed on causes and mechanism of such failures. Cracks may travel at speeds up to 6,600 feet per second. Impact properties of the material, bends, overburden and energy available in the pipe line are factors in progress of such a rupture.

In the pipe produced, the induction weld was normalized using the residual heat from welding and an auxiliary inductor bar.

While this method is being successfully used in the manufacture of small diameter pipe the production of induction welded large diameter pipe is a more difficult problem. One of the major problems in experimental use of induction welding of large diameter pipe was the control of the air gap between the inductor bar and the seam being welded.

Experimental equipment used is shown on Page 26. The induction welded pipe is shown as it leaves the welding machine. In induction welding it is essential to secure a properly fused weld which may then be slightly upset.

Proper control of the temperature of this process is a critical factor in making a satisfactory weld. The upset weld may be produced so that machining is not required and a satisfactory weld reinforcement is obtained. Due to technical problems encountered in the induction welding process this method of welding large diameter pipe is not being employed at the present time.

Gas Shielded Arc Studies. A new inert gas shielded arc automatic welding process which can be conveniently adapted to present production equipment is being developed. This new process eliminates the use of flux and may prove to be a more economical method for manufacturing large diameter pipe. The speed of welding by the new process appears to be promising and it should be possible to use tandem electrodes. If the process is successful, it may be adaptable to field girth welding of line pipe.

What Causes Failures and Fractures. One of the most important developments in the study of line pipe failures is the use of chevron markings present on the fractured surface of the failure for detecting the origin of the failure. Chevron markings point to the origin of the failure; when the cause of failure has been established it has been possible in many instances to take preventative steps against future failures.

Failures may originate in a defect such as a gouge or laceration resulting from construction machinery. Also, defects may occur in or adjacent to the longitudinal weld or in seams, laminations, slivers or scabs. Most of these defects originate in the manufacturing process although the notch area adjacent to the weld and the body of the pipe may be damaged during transportation.

Some Long Ruptures Occur. There have been a number of gas pipe line failures during proof testing which have been over 500 feet in length. Various opinions have been expressed regarding these long failures. Some have expressed the view that if lines were properly purged or tested with air that the long failures would not have occurred. Others think that construction characteristics and the properties of steel pipe in addition to the temperature, size of pipe and pressure on the line may explain the behavior of the pipe line in the presence of a harmful defect.

Fire May Not Accompany Rupture. There have been long failures when testing with gas in which a fire did not occur. If long failures were due to explosive mixtures of gas and air in the line, fire should occur. Experiences with failures in air testing have not been made available and apparently long failures have not occurred under these conditions.

Very Few Failures Occur in Service. Nor have long failures been reported in the literature after the gas pipe line has been in service and properly purged, providing hydrogen embrittlement is not encountered. This does not mean, however, that long failures could not occur in service. When a failure occurs in a pipe line and the fracture is in cleavage, the velocity of the crack will depend upon the amount of energy available in the pipe line, properties of the material and other factors.

Cracks may travel at speeds up to 6,600 feet per second, which has been measured in large plate tensile specimens. When the crack's velocity exceeds the speed of sound in natural gas, 1,300 feet per second, the crack may travel indefinitely except for other factors which would change this condition. The impact properties of the material which depends on temperature may influence the behavior of the crack. Other factors are the physical characteristics of the pipe line, such as bends; the amount of overfill and the energy available for rupture of the pipe.

It has been observed that several cracks may be traveling simultaneously in a failure and that in certain cases these cracks may be in the shape of a sinusoidal wave. It is quite possible that a critical velocity is associated with a sinusoidal wave and that the wave length may vary considerably. When the fracture is in shear the

velocity is apparently low and a sinusoidal wave does not occur. When the fracture is in cleavage with very rapid fragmentation a sinusoidal wave would not be observed due to the high velocity and large number of different cracks at the same time in the line.

Usually, when a pipe line failure terminates, the fracture changes from cleavage to shear and the path of the shear fracture is such that it tends to choke off further rupturing. Cracks traveling in the circumferential direction of the pipe starting with an angle of approximately 45 degrees with respect to the longitudinal direction of the pipe chokes off the failure. It may also be possible to observe in cleavage fracture a shear lip which may be related to the velocity of the crack.

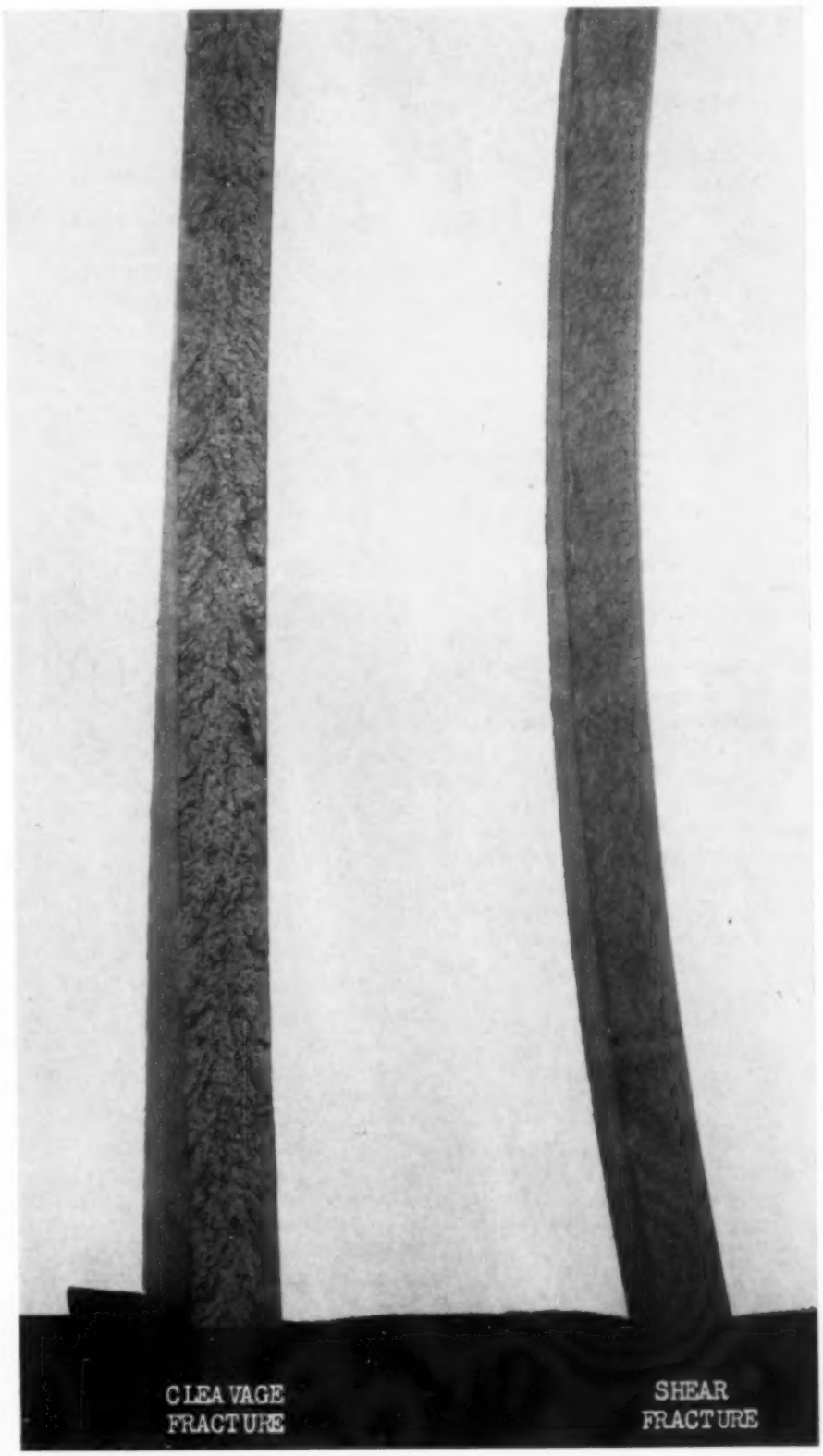
More Research on Failures Needed. In order to fully understand pipe line failures, considerably more research work of a fundamental nature will be required. However, it has been observed that failures originate in defects; therefore it is desirable to develop a better understanding of a harmful defect. This has been accomplished to a marked degree by observing the origin of various failures.

If the cause of a failure can be controlled, and there has been considerable progress in this direction, the importance of fully understanding the behavior of failures is of less importance.

Fatigue Defects May Be a Factor. In studying pipe line failures, it has been observed that in certain cases a failure may occur at the notch adjacent to the longitudinal weld bead. These types of failures have been the subject of considerable thought and investigation. As a result, it has been determined recently they may be associated in certain cases with the phenomena of fatigue occurring during the rail transportation of the pipe. Laboratory studies during the past year have disclosed that these fatigue type defects can be produced in ordinary cyclic stressing and also in resonance. In addition to observing fatigue type failure in line pipe these have occurred during rail transportation of structural members.

It is not practical to eliminate all defects in pipe lines, so it becomes necessary to consider only the harmful defects in the manufacture of pipe and construction of the line. Importance of proper inspection is recognized and considerable progress is being made in this area.

Testing of Pipe Lines. The most important factor, however, in the construction of a pipe line is proper proof testing. To eliminate long failures, water should be used. Air could be used to eliminate explosive mixtures, but it has not been established that the use of air would eliminate a long failure in proof testing. It has been



Specimens showing the appearance of typical cleavage and shear fractures in an electric welded line pipe fracture. Chevron pattern points toward the origin of the fracture.

proven, however, that water testing will eliminate and reduce the hazards of long failures during proof testing.

Low Temperatures May Increase Chance of Long Fractures. In the construction of pipe lines, low ambient temperatures may prevent proof testing with water. Use of an antifreeze at very low temperatures would be costly and therefore not practical. It should be noted, however, that the possibilities of a very long fracture are increased if a defective piece of pipe is encountered during gas testing at low temperatures.

Pipe lines which must be proof tested at low temperatures may be tested with gas and operated at a low pressure with circumferential stresses possibly not exceeding 10,000 psi, and later hydrostatically tested at the required pressure so that the line may be operated at its design pressure.

How High Should Test Pressures Be? In the hydrostatic testing of a pipe line, higher testing pressures than are required in the codes for gas testing may be used. This will provide a safer pipe line due to the elimination of any additional defects present. However, it would appear that the test pressure should not exceed the specified minimum yield strength in accordance with the specification for the material.

There have been pipe lines tested to the actual yield strength of the material. This would mean that the lowest yield strength material would actually yield during testing of the line. Hydrostatic testing would be required in order to determine the yield strength during the testing of a pipe line. It is our understanding that pipe lines tested under these conditions, in the majority of cases, have been satisfactory in service.

Hydrostatic testing is not only a relatively safe testing procedure, but also any break that may occur if a defect is encountered will be very short. However, if pipe is expanded during hydrostatic testing beyond the yield strength without indicating yield, the material may indicate satisfactory service but would be a potential source of failure at some future time due to the excessive expansion of the pipe.

X-Ray Examination of Line Pipe Welds. In the manufacture of submerged-arc welded line pipe, radiography may be used as a control of weld quality. Although line pipe specifications do not provide for radiography, it is used as a process control procedure and is the most reliable test available at the present time for this specific purpose.

Recently, a new method for the continuous X-ray examination of line pipe has been developed. This method, which does not require the use of a film, is in the advanced experimental stage. It has possibilities of providing an X-ray examination at a lower cost than by usual methods. It is not only adaptable to the longitudinal weld, but also may have application to the field girth weld.

With this method of testing, it may be possible to improve quality control of the weld after the expansion of the pipe in the manufacturing process. Although this new technique has been primarily developed for submerged-arc welded pipe, it can be used advantageously for any type of welding if there is a desire to examine the weld after expansion.

Properties of X56 Line Pipe. A new grade of line pipe has recently been developed and is being produced on a commercial basis. This new grade is available in seamless and large diameter electric weld line pipe sizes which are expanded in the manufacturing process.

Chemical and mechanical properties of line pipe not exceeding ⅜ inch in thickness are as follows:

Ladle Analysis:	Carbon	Manganese	Phosphorus	Sulfur
Seamless—Expanded	.32 max.	1.35 max.	.04 max.	.05 max.
Welded —Expanded	.31 max.	1.35 max.	.04 max.	.05 max.

Mechanical Properties:	Yield Strength	Tensile Strength	Elong. in 2 in.
	56,000 psi min.	74,000 psi min.	20% min.

This higher yield strength grade of pipe is being achieved by a slight increase in the carbon and manganese content compared with Grade X52 pipe. Only a limited quantity of this pipe has been produced; after more experience has been obtained it may be possible to lower the carbon content. In addition to this 56,000 yield strength grade, experimental work is being actively conducted on the production of line pipe with higher mechanical properties. In this experimental work an effort is being made to secure higher mechanical properties with the same weldability that exists in the new Grade X56 line pipe material.

ACKNOWLEDGMENT

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Saylor

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W. A. Saylor, chief metallurgist, Consolidated Western Steel Company, has handled a large variety of research and development projects during his 14 years with that firm, including large-diameter high strength pipe, stainless steel fabrication, wind tunnel work, and missile development. Prior to joining Consolidated Western, he was division superintendent of steel production for Kaiser Steel where he helped to organize and put into production the company's steel production facilities during World War II. Saylor, a registered mechanical and chemical engineer, is active in several engineering societies, including AIMME, ASM, AWS, and ASTM. He holds a B.S. degree in chemical engineering from Penn State, with graduate work in metallurgy (1930-35) at Carnegie Institute of Technology and other related subjects at the University of California at Los Angeles (1948-56).

Arthur B. Wilder, chief metallurgist, National Tube Division, United States Steel, is the author of more than 35 technical articles on steel making, line pipe, steels for high temperature service, oil country goods, and Bessemer seamless pipe. Active for many years in oil and steel industry affairs, he is a member of committees in API, ASME, AIME, ASTM, AISI and ASA. Wilder holds B.S., M.S. and doctor's degrees from Mount Union College, Ohio State University and Harvard University respectively.

New Construction and Operating Ideas Brought Progress in 1958

Improved welding and coating methods, advances in submarine pipe line construction, automation and custody transfer led the way

By John C. Watts
Engineering Editor, PIPE LINE INDUSTRY

AUTOMATION, a word applied to virtually every industrial field in recent years, has been getting a lot of attention in pipe line construction and operations. New ideas in equipment, materials and systems for better control on all phases of operation promise greater efficiency for pipe line operating companies and contractors in 1959.

Advancements of the past year helped contractors solve problems of laying pipe in offshore areas, in rugged terrain faced on the Trans-Canada project, and in U.S. work. A new offshore barge with an automatic pipe handling way and flotation stinger support brought progress in laying submarine lines. Later in the year, an operating company completed successful tests of a new caisson for completing underwater tie-ins.

Two new schemes for virtually automatic welding were introduced. In a new automatic double jointing yard at Baton Rouge, La., contractors completed double jointing 24-inch pipe with a process that completed welds in two external passes. A few months earlier a German process, used on utility lines in Europe, was shown to contractors in Houston.

Coal tar-epoxy coatings and the pressure sensitive tapes also gained in acceptance for protection of pipe lines, with a major gas transmission line to Florida being coated with tape. There were several yard applications of coal tar-epoxy coatings using specially designed blending heads for the catalytic setting components.

Automatic custody transfer and automation in station controls continued to create interest with completion of Gulf Interstate Gas Company's five new automatic and unattended stations. Other automatic stations including reciprocating units, were also placed in service by major gas transmission companies. LATC continued to gain acceptance in crude oil movement.

Faster Field Welds and Double Jointing Promised

DURING THE last half of 1958 several new ideas in welding promised faster, higher quality welds for pipe line construction. At a new automatic yard near Baton Rouge, Bechtel Corporation double jointed about 25 miles of 24-inch pipe for Oklahoma Contracting Company spreads on Coastal Transmission Company work.

This welding operation was a completely automatic double-jointing process with all welds being made from outside the pipe. No internal weld nor manual welding is done during the double jointing. The weld is made in two passes; it takes about five minutes for each weld. Bechtel reported making about 75 welds per day and anticipates doing better after line-up procedures are smoothed out.

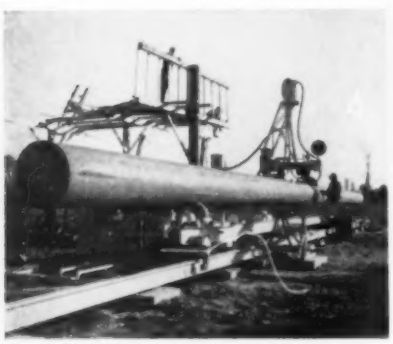
Pneumatically operated jacks bring the joints to the buffing, line-up and welding stations. After the submerged arc weld is completed, another jack trips the pipe onto a storage rack.

One unique feature of Bechtel's automatic double-jointing yard is a "dogleg compensator" which allows for any eccentricities in a pipe joint while it is rotated during welding. When joints are lined up, it is locked to a setting to maintain a fixed gap.

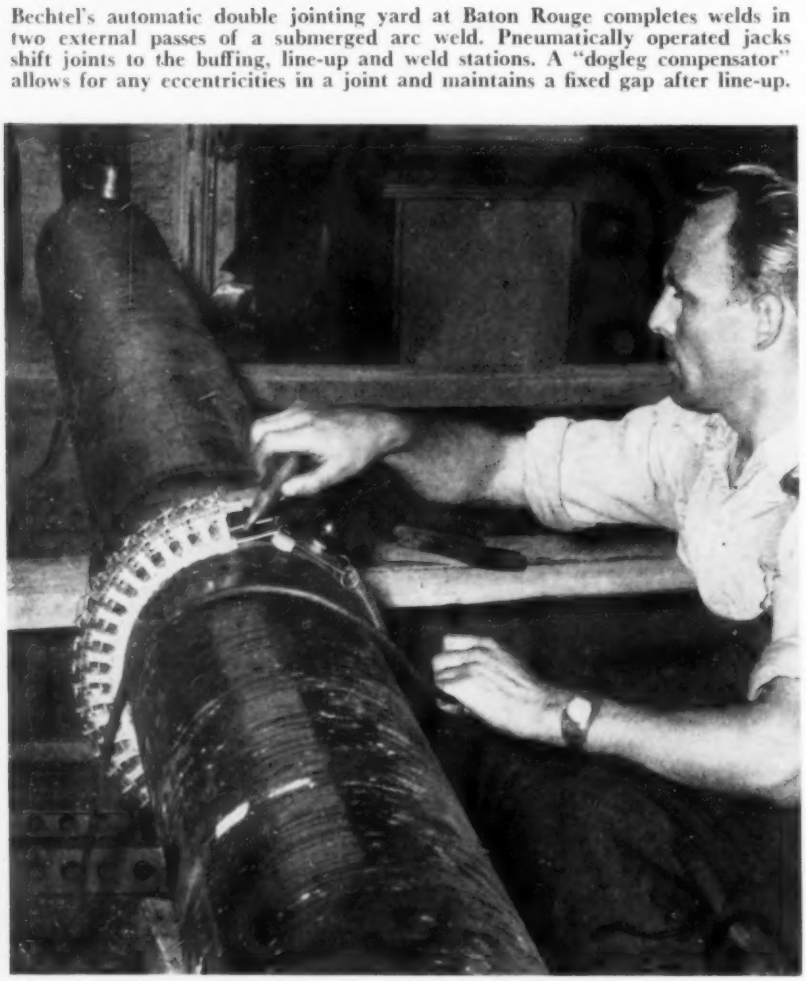
A pneumatic line-up clamp is equipped with segmented copper shoes which expand to cover the entire inside circumference of the pipe. Fiber glass tape fastened around the shoe protects the clamp against burning and also fits to the contour of the pipe producing a smooth interior finish of the root bead. The automatic welding head is supported by a mechanism which provides for both vertical and lateral movement and insures a given offset distance from center of pipe to point of the weld.

Metal deposit is thus kept constant during the automatic welding.

Bechtel's double-jointing plant is portable enough for work closer to the spreads on the right of way. All power equipment is housed in one trailer. This includes a diesel engine driving the welding generator, an air compressor for operating the jacks and controls and a spare welding machine. Future plans call for extending the shelter completely over the welding machine so that it may be used in any kind of weather.



Bechtel's automatic double jointing yard at Baton Rouge completes welds in two external passes of a submerged arc weld. Pneumatically operated jacks shift joints to the buffing, line-up and weld stations. A "dogleg compensator" allows for any eccentricities in a joint and maintains a fixed gap after line-up.



German automatic welding method uses a magnetic girdle to hold the rod in the bevel and direct the progress of the arc. A segmented backup piece holds the rod in the bevel and provides the correct gap for the pole shoes of the electromagnet cores that direct the arc. Several belts are used at one time on larger diameter pipe; welds have been made on pipe to 26 inches in diameter.

A German magnetic girdle method which had been used on some 20 miles of 8- to 12-inch utility lines in Germany were shown to U.S. contractors in Houston in the fall.

In this method, the girdle holds the rod in position, controlling the arc and thus directing flow of the molten metal by means of the magnetic field. While the girdle holds the rod in the bevel around the joint, molten metal flows into the joint and the weld progresses down hill in much the same manner as in conventional welding.

Segments of the belt are linked together so that it looks like a giant caterpillar gripped over the joint. (See PIPE LINE INDUSTRY, November 1958, Page 42.) A segmented backup piece holds the rod in the bevel and provides the correct gap for the pole shoes of the electro-magnetic cores. Outer elements of the girdle are a series of electromagnetic coils held in place by mechanical linkage.

To make a weld, the rod may either be bent and slipped around the pipe joint set into the holder contacts of the belt before it is snapped over the joint. In either case, it makes a direct pressure contact with the welding current connectors of the belt; the flux coating insulates the rod itself from the metal joint.

After the belt is snapped onto the pipe and power settings made on the welding machine control panel, the welder shorts out the rod to strike the arc.

Especially designed line-up clamps are used with the belt to precisely control the root face gap. The internal line-up clamp has retractable shims which provide a proper gap during the stringer bead.

Several belts may be used at once on larger diameter pipe; ordinarly one belt is used on pipes smaller than 10-inch and welds are completed in semi-circular steps. To speed up welding on the larger diameter pipe, up to four belts have been used on pipe as large as 26-inch. Ordinarily it requires about one minute per pass for each belt in actual welding time. Flux is cleaned from the weld with a wire brush and each end of the weld is ground down between passes. Filler passes are staggered to eliminate possibility of windowing.

New Caisson Makes Underwater Tie-Ins

REPAIRS AND CONNECTIONS to underwater pipe lines, long a serious problem, are becoming even more important with increasing construction of offshore lines. Except in very few cases, pipe lines have been lifted above the water; this is often an unwieldy operation and in rough weather can be dangerous.

A new caisson designed by Interstate Oil Pipe Line Co. engineers under a joint research project with Esso Research & Engineering Co. promises economical, and safe tie-ins for different sizes of lines from 2 to 20-inch in depths of water up to 50 feet. In its first field test, an initial tap and connection were made in one day with a minimum of marine equipment. (See PIPE LINE INDUSTRY, November 1958, Page 72)

The caisson is constructed of ½-inch steel plate with stiffeners to handle hydraulic pressures of the water around it. The bottom of the caisson is 7 feet in diameter and bell shaped with a vertical split; pipe sleeves extend midway up the side of the split.

When clamped around the pipe it has a deck on which men may stand to accomplish their work inside. A five-foot diameter top section resembles a huge barrel extending up 6 feet. Additional barrel-like sections in 6 and 12-foot lengths may be joined to the top of the caisson to adjust for depths of water.

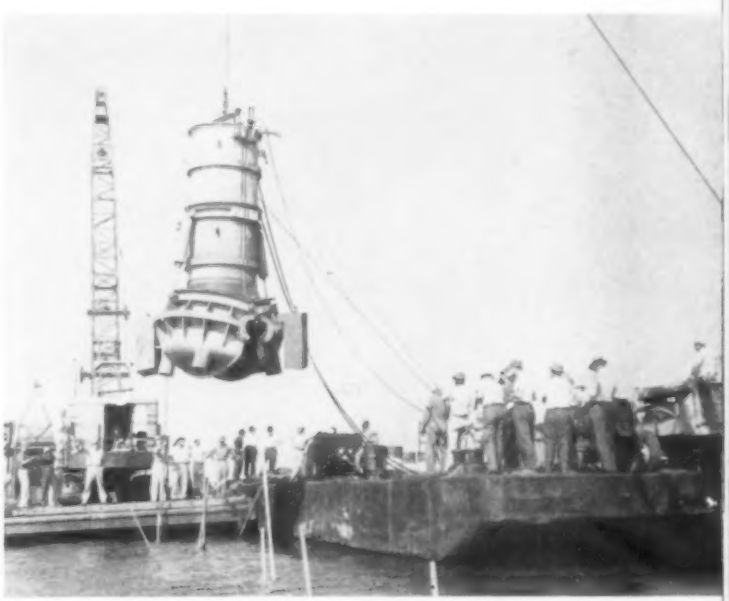
The bottom and parts of the basic caisson are connected by a continuous neoprene rubber sleeve which permits opening and closing of the clamps. Two hydraulic rams connect the bottom and top sections. These rams are connected by a hose to a pump unit on the work barge. Hydraulic rams open and close the split section clamps around the pipe near the bottom of the caisson.

To make a tie-in the caisson is lifted by a crane from a barge and lowered over the line previously located by survey. Then the bottom section is clamped around the pipe by the hydraulic rams.

Water in the caisson is then pumped out by a sump pump installed in the caisson.

Interstate's new tie-in bell weighs approximately 16,000 pounds. Up to 12 weights of 3,900 pounds each can be hooked on to the bottom section to overcome the buoyancy of the evacuated caisson.

First field tests were made in Barataria Bay in about 7 feet of water with the line located about 11 feet below the surface. Mud was jetted away from a section of the line for tests. Two weights were used; two crane barges and a work barge were also used in the operation.



Repair and tie-in caisson developed for submarine pipe line work in waters down to 50-foot depths promises safe and economical welding on submarine lines in-place. In its first test in Barataria Bay, Louisiana an initial tap and connection were made in one day. The caisson is constructed of ½-inch steel plate with a bell shaped bottom and cylindrical side sections. Hydraulic rams open and close the bottom and top sections; sealing is provided by a neoprene rubber sleeve.

New Barge Speeds Submarine Work

WITH SEVERAL hundred miles of pipe line completed in waters of the Gulf of Mexico and South Louisiana during 1958, important strides in methods of laying offshore lines are being watched with interest by pipe line engineers.

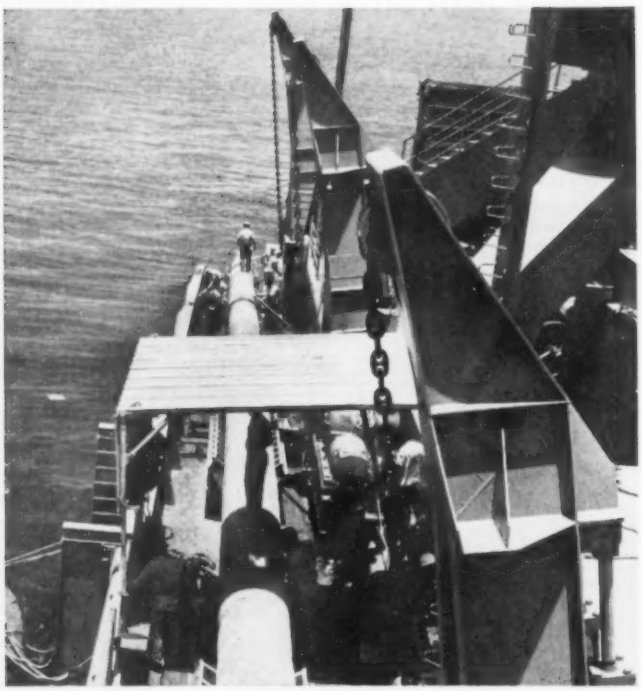
Brown & Root's new $2½ million barge, the L. E. Minor, uses many innovations to speed pipe laying and control the completed pipe string even under adverse weather conditions.

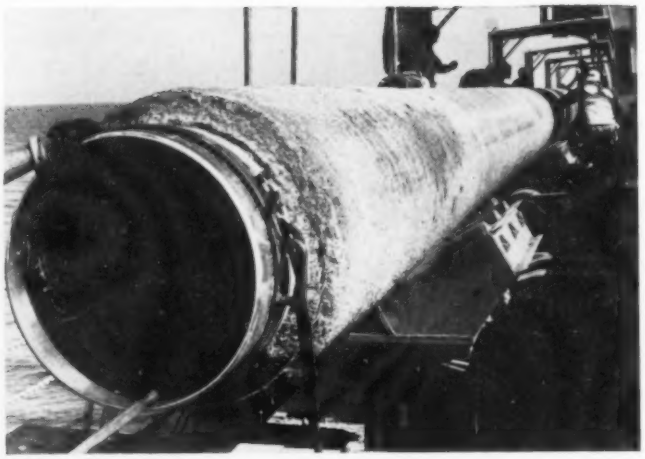
An automatic stalking station reduces pipe handling to a minimum. Two pipe storage racks provide a continuous supply of pipe to the welding launchway; the forward rack has an electric powered conveyor system which automatically feeds pipe to the line up rollers on the pipe workway and eliminates the need for side booms on deck. Sections of the forward conveyor rack fold upward and inboard to permit the barge's gantry crane to move the full length of the barge. Pipe storage for additional joints is provided below deck. (See PIPE LINE INDUSTRY, July, 1958, Page 26.)

Davits along the starboard side of the barge go a long way toward solving the problem of handling the completed pipe string whenever it has to be lowered to the bottom in case of rough weather or picked up when returning to location. Five heavy-duty davits spaced at 60-foot intervals can lift the completed string off the pipe launchway, swing it out and lower it over the side to the floor of the Gulf.

Anchor chain falls for the davits are left attached to pipe when the lowering is completed and secured to buoys to mark pipe location. This eliminates the need for sending a diver down to rig cables or chains to lift the pipe string when resuming work.

Concrete coated pipe is supported astern on a twin flotation cradle or "stinger." Two 320-foot long flotation legs are subdivided providing eight separate flotation





This new $2.5 million barge, the L. E. Minor, features several big advances in submarine pipe laying. An automatic stalking station cuts down on pipe handling and eliminates need for a side boom on deck. An electric powered conveyor system automatically feeds pipe to the line up rollers on the pipe workway; sections of the rack fold up and inboard to permit a travelling gantry crane to move the full length of the barge. Heavy duty davits on the starboard side can lower the completed string over the side in case of rough weather or storms. An eight-cell twin leg flotation cradle supports the completed string astern during laying.

cells in each. Valving permits partial or complete flooding of the cells to give the completed string the proper support as it trails to the bottom. Rubber roller cradles fabricated between the flotation legs support the pipe string; a heavy steel yoke and pinion at the leading end of the stinger attach it to the after section of the launchway. A specially built spoon-shaped bow reduces spray and enables the barge to stay on location in rough weather.

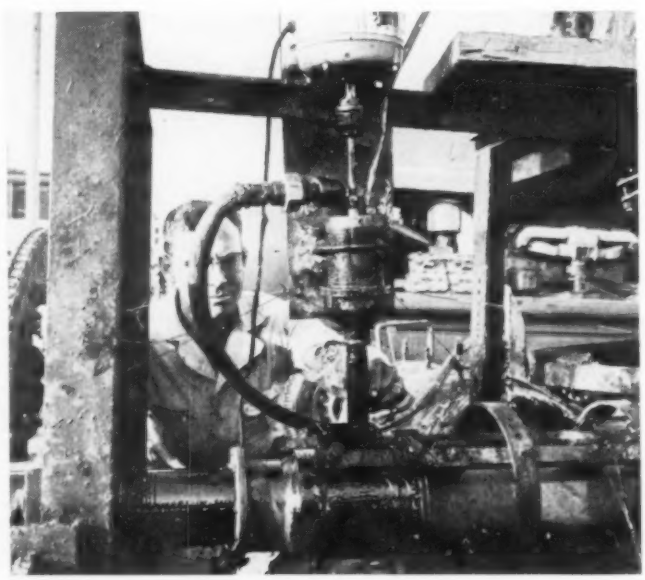
Engineering and living space are provided below deck. Ships power is rectified by three 400-ampere DC units to supply each of the five welding stations on the workway.

Thin Film Coatings in First Field Tests

ADVANCES IN APPLICATION techniques made possible extensive usage of coal tar-epoxy coatings for external protection of pipe in two major installations. Coating was sprayed on pipe which had been preheated to 165° F. in one application (PIPE LINE INDUSTRY, January, 1958, Page 49). For the other application a converted coating machine was used. Coating components were metered in proper proportions into the mixing-head and the mixed coating fed into a coating shoe which extruded the coating around the pipe. (PIPE LINE INDUSTRY, March, 1958, Page 48.)

Major advantage of the coal tar-epoxies is resistance to mechanical damage during construction. Coated pipe can be handled during stringing and laying without special precautions. Substantial savings in construction costs can be realized. Another advantage is that the coating is applied in one coat with no protective outer wrap.

Continuing development work should remove most of the objections to the material, such as slow set-up time and make its use more extensive. Additional development work is also being given application equipment which should make the application cheaper and faster.



In a significant advance in pipe coating methods, a converted coating machine applied a coal tar epoxy blend to the joints in yard application. Components were metered in proper proportions into the mixing-head. Mixed coating material was then fed into a coating shoe which extruded coating around the pipe.

LACT Installations Double During Year

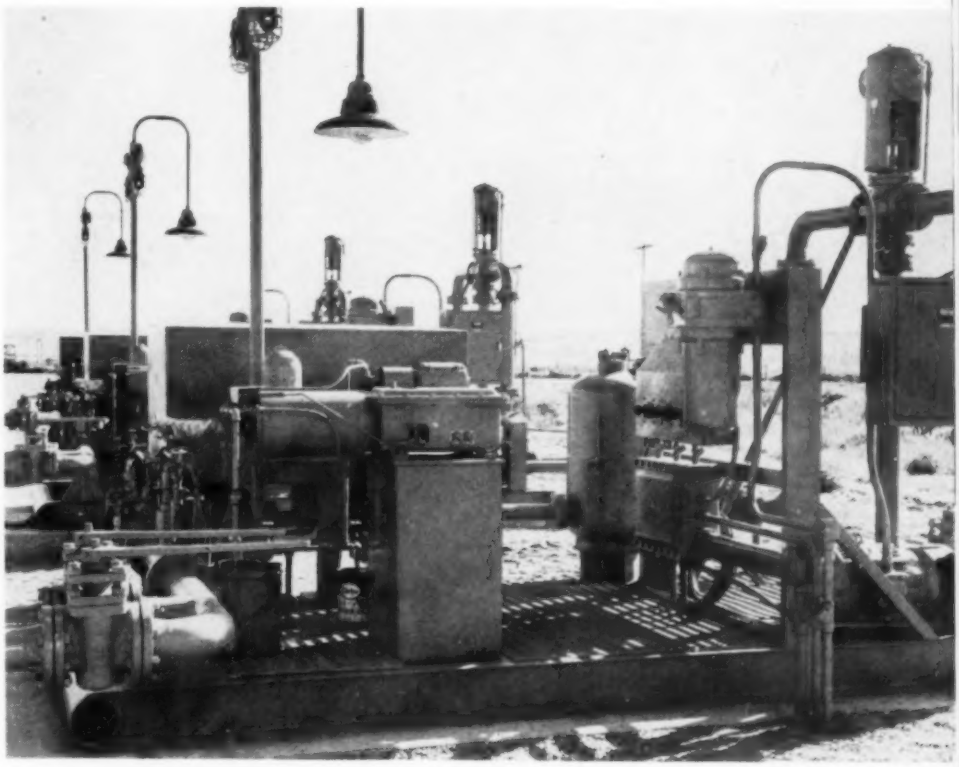
ONE OF THE BIGGEST advances in the field of automation was in the use of lease automatic custody transfer. Economic studies indicate that LACT has almost unlimited potential application which should net good returns to the industry.

Early in the year the API committee on LACT prepared a questionnaire in an effort to learn the number and types of systems which were in operation or under construction. The survey is believed to cover nearly all LACT facilities in operation, under test or under construction. Data given covered a total of 99 installations, all of which were expected to be in operation by July, 1958, and involve 18 producing companies, 29 pipe line companies, and locations in 12 states and two provinces of Canada.

Total throughput for the systems amounted to 170,000 barrels per day. About half is handled by unattended facilities. Production handled by LACT accounted for less than 2.5 percent of the production in the United States and Canada.

The comparative growth of meter systems is greater than that of tank systems. For over two years tank systems have held a substantial lead; however, by mid-year 1958 there were approximately as many meter systems in operation as tank systems. (See PIPE LINE INDUSTRY, April 1958, Page 52.)

A large part of the oil handled by LACT during 1958 is the result of one installation. Arapahoe Pipe Line Company received 743,058 barrels through custody transfer metering units from The Pure Oil Company as operator of the Adena J Sand Unit, Morgan County, Colorado, between April 15 and July 15, 1958. With a capacity of 36,000 barrels per day, this unit alone accounts for more than 20 percent of the capacity reported in the API report. (See PIPE LINE INDUSTRY, November, 1958, Page 46.)



Skid mounted positive displacement meters are showing a steady growth in the transfer of crude oil. A large share of the oil handled by LACT during 1958 was handled by one installation. Arapahoe Pipe Line received 743,058 barrels through this unit from Pure Oil, operator of the Adena J. Sand unit in Colorado.

Tapline's Oil-Fueled Turbine Stations Add Flexibility

IN AN EXPANSION project to hike capacity of its Middle East line to 450,000 barrels per day, Trans Arabian Pipe Line Company added six 5,000-hp oil fueled gas turbine units directly driving centrifugal pumps.

Turbine pumping units are of two types, portable prefabricated units for unattended operations at intermediate sites and permanently installed units at existing stations.

The auxiliary pumping units mark several innovations in pipe line application of turbines. It is the first time that a main line oil pump has been driven directly at gas turbine speeds; average speed is between 5,000 to 6,000 rpm, considerably higher than that used ordinarily for crude oil pumping. Stations are virtually portable with the 5,000-hp units prefabricated and mounted on giant size truck trailers. These auxiliary stations are unattended and remotely controlled.

Pumping units are driven by a simple cycle combustion gas turbine rated at 5,000-hp output for continuous operations at 110° F. ambient temperature and 2,600 feet elevation. The prime mover is fueled with crude oil taken directly from the pipe line. Stations are designed for unattended operation by supervisory control from base stations 50 to 100 miles away, these units are portable enough to permit rotation and major overhauls at a central shop.

Initial operating studies proved the design of the stations. In early operation, one of the auxiliary pumping units had several months of unattended operation with an availability factor of better than 90 percent. Another

was successfully operated unattended after a trial run of only 80 hours.

Tapline's engineers feel that these stations are well adapted auxiliary pumping units which can be successfully operated by remote control. Future applications would be extremely attractive from the standpoint of investment per horsepower on pipe lines where large power requirements are needed at remote areas. Cost of the Arabian stations was about $250 per brake hp or one-sixth that of a conventional community type Middle East pumping station. Early operating experience shows that auxiliary pumping units have a high degree of reliability and relatively low operating cost in spite of a fuel consumption per horsepower hour approximately twice that of installed diesel engines (See PIPE LINE INDUSTRY, April, 1958, Page 43).

Tapline's new oil fueled gas turbine pumping stations completed initial service tests with a high degree of reliability and reasonably low operating costs in spite of higher fuel consumption than diesel engines. Stations are virtually portable units; pumps are driven by a 5,000-horsepower single cycle gas turbine. They are designed for unattended operation by supervisory control from base stations 50 to 100 miles away. Cost is about 1/6 that of other Middle East stations on a dollars per hp basis.

New Deep Groundbeds Handle Tough Protection Problems

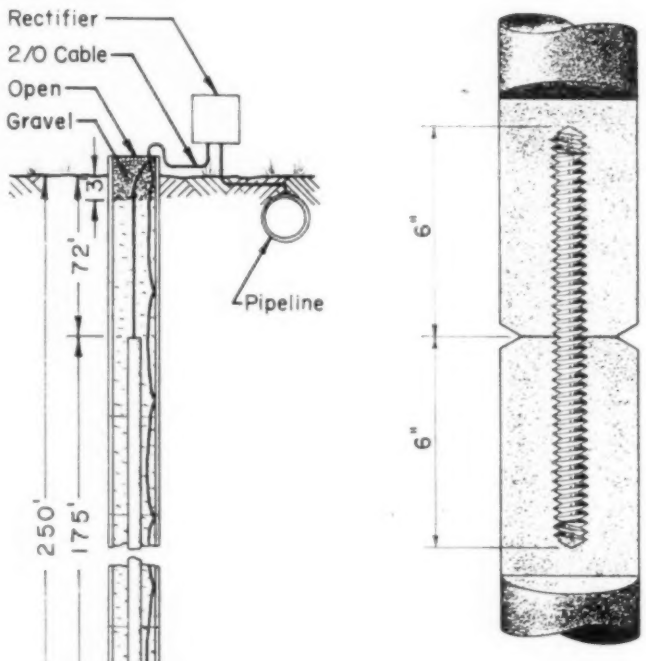
CORROSION ENGINEERS for years have studied the advantages of deep steel pipe groundbeds in areas where surface groundbeds proved too costly or were not satisfactory in high resistance soils. Interstate Oil Pipe Line Company made some real progress toward solving this problem by use of a deep graphite groundbed backfilled with coke breeze backfill and installed inside a steel casing. (See PIPE LINE INDUSTRY, October, 1958, Page 40.)

Important advantages of the new groundbeds are low circuit resistance even in high resistance soil making possible economical protection of bare or poorly coated pipe. Their geometric location relative to the pipe line coupled with the low circuit resistance extends coverage.

Interstate found that interference problems with foreign structures were very minor, and engineering and corrosion surveying costs required for locating low resistance soils were reduced. Right-of-way problems for the deep groundbeds were less since they were used on existing pipe line rights of way. More uniform resistance in spite of seasonal changes and the cost savings have proven to be important, too.

Anodes designed by Interstate Oil consist of 35 graphite rods 3-inch by 60-inch fastened with studs and sealed with a special resin cement. A continuous insulated wire was connected to every joint of casing and to the bottom and top graphite rods to insure continuity even in the event of casing separation. Coke breeze having a minimum diameter of 1-inch was used as a backfill between the rods and the steel casing. Casing and rods were installed in a step by step procedure for each joint.

—The End



Important advantages of the new deep graphite groundbeds developed by Interstate Oil are lower cost installation for extended coverage through reduced circuit resistance. Thirty-five 3-inch by 60-inch graphite rods were fastened together with studs and sealed with a special resin cement. Space between the steel casing and the rod was filled with coke breeze.

CONSTRUCTION PROGRESS REPORT

Looking upstream, the Coal Valley road crossing and Pennsylvania railroad underground crossing.

Engineering Twin 55- and 43-Inch Lines

Highly congested R.O.W., 'wet and dirty gas,' and giant size pipe made its design unique

By F. E. Culvern
Williams Brothers Company, Tulsa

THE TREND to larger diameter gas transmission lines has moved ahead several "inches" with the construction of Carnegie Natural Gas Company's twin 55- and 43-inch lines. Serving six major plants, these giant lines begin at the booster station of the U. S. Steel Corporation's coke oven plant in Clairton, Pennsylvania, and extends down the Monongahela River Valley to the Homestead District steel works at Munhall, Pennsylvania, a distance of approximately 12¼ miles. The upstream section consists of 8 miles of twin 55⅜-inch pipe, with the remaining 4¼ miles consisting of twin 43¼-inch.

Additional Capacity Needed. The new lines will replace a system of 24-inch to 48-inch lines, which have been in service for various lengths of time dating back to 1907. The decision to replace these lines was based on an extended study to determine the most economical procedure for rehabilitating the existing gas distribution system. During the course of the study, the following types of systems were examined.

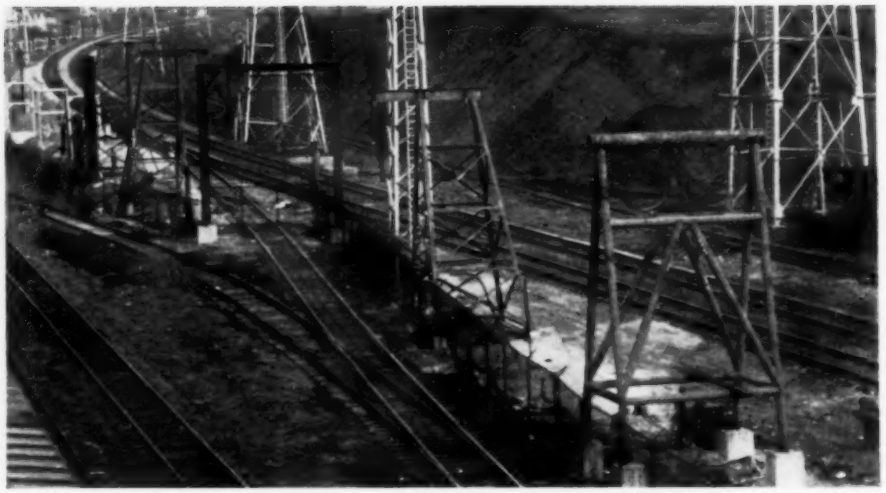
- A new low pressure system (15 psig inlet pressure)
- A new high pressure system (100 psig inlet pressure)
- Rehabilitating one or more of the existing lines
- Various combinations of the above systems

Over-all economy and reliability indicated a low pressure system consisting of two new parallel lines. The lines were designed for an efficiency that would allow them to carry their design quantities after 20 or more

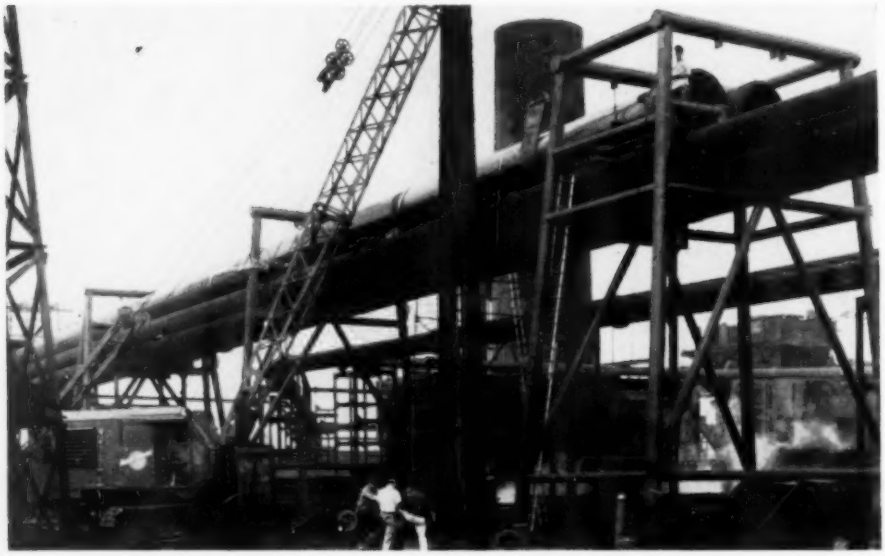
years of operation. A study of the operation of the present system yielded data which led to the conclusion that an efficiency of 47 percent, based on the transmission factors given in the U. S. Bureau of Mines Monograph 9, would provide the necessary capacity. The major flow quantities and pipe line sizes are given in Table 1.

Deposits Must be Controlled. Deposits in the original lines have gradually reduced the cross section of the pipes to such an extent that the pressure drop in some sections has become intolerable and the average of all sections has been a reduction in efficiency of over 50 percent. In addition to the lowered efficiency, the exterior of the pipe, which was laid bare, has suffered severe corrosion and is being maintained at considerable cost. The gas, as presently distributed, is "wet and dirty"; even though the gas has been processed through a by-products recovery plant and most of the condensibles, except water, have been removed. A water wash and a light oil wash is the basic treatment given the gas. Residue gas is then boosted through centrifugal compressors to transmission pressure of 15 psig and discharged directly into the line at a temperature of 200° to 250° F.

Gas leaves the water wash saturated with water at atmospheric pressure and a temperature of 100° to 105° F. (approximately 3000 pounds of water

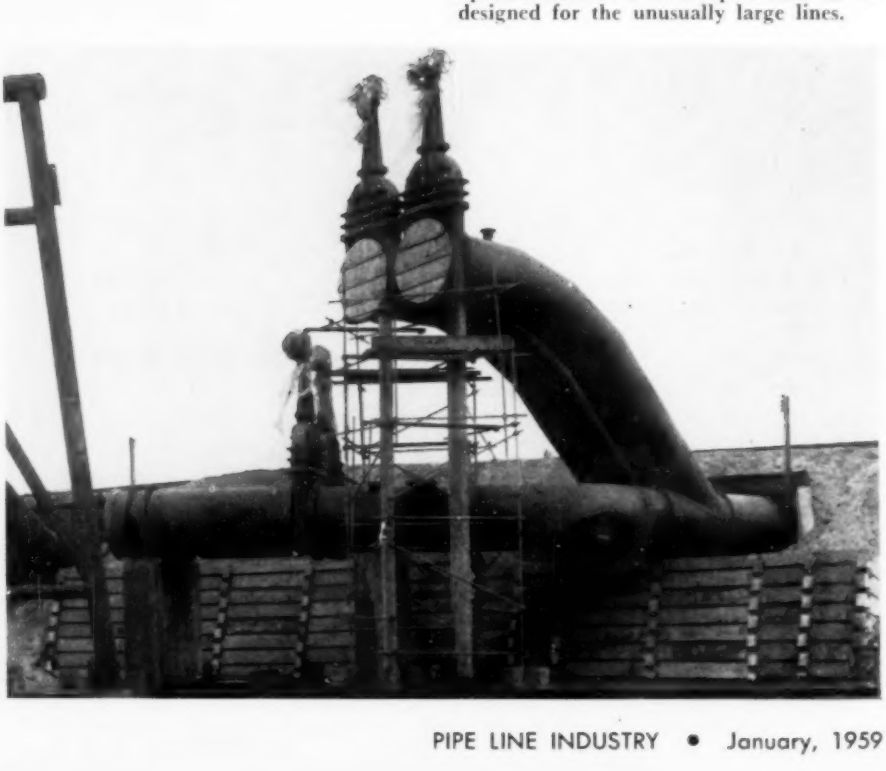


The view above from the Glassport bridge shows high towers spanning railroad tracks and low towers continuing downstream. Approximately two-thirds of line is above ground.



At left, 55-inch pipe is being laid inside Clairton Works. Line extends from coke ovens at Clairton, 12¼ miles to the Homestead District Steel Works. Six major plants are served in route.

Clairton scraper launcher (below) with 53⅜-inch mainline take-off to compressor station. Deposition of tars and resins and condensed water makes it necessary to provide means of internally cleaning line. Special closures and scrapers had to be designed for the unusually large lines.



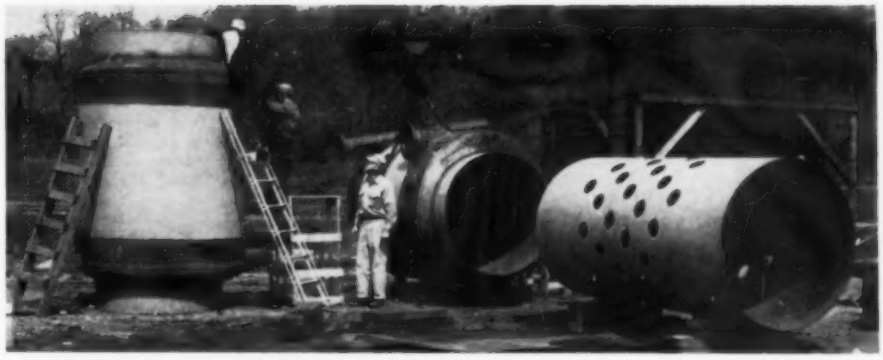
per MMCF of gas). The light oil wash does not remove 100 percent of the absorbable materials and also leaves a residue of oil vapor in the gas. Over-all result is that considerable quantities of resins and tars are condensed in the pipe line. All these factors have contributed to the gradual deterioration of the existing pipes and were considered in the design of the new system.

Under conditions presently existing, the cost of eliminating the undesirable constitutents in the gas is not justified.

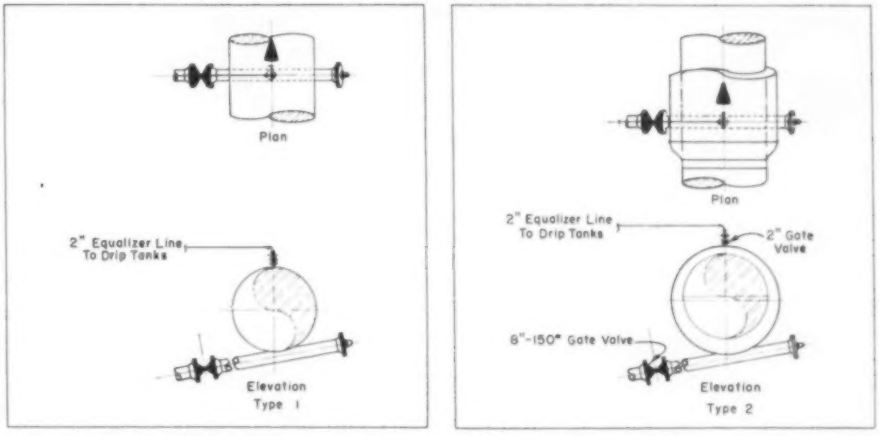
ROW Congested. No major additions have been made to the original system in more than 20 years, and there has been a considerable increase in the population and industry occupying this area. Although the line was only 12¼ miles long and experienced route locators can normally locate that much line in a few days; then have it surveyed in a couple of weeks, this location and survey took almost six months. Most of the level ground was already occupied, making it necessary to traverse a considerable amount of rough ground, and to "squeeze" the pipe through some areas hardly wide enough for the pipe—without accounting for the necessity of having space for construction equipment. At one point, the best location was directly through a two-story house. This house was bought and razed.

Alignment Critical. Pipe of this size in close quarters cannot be left to approximate location, such as is common practice in ordinary cross country lines. Each joint must be located on a drawing both horizontally and vertically to the nearest 1/1000 of a foot, in the same manner that refinery and industrial lines are detailed. This was necessary both for clearance reasons in some areas and for line-up where joints of pipe were welded or coupled. Pipe of this diameter has almost no "spring" and will not conform to any irregularities of line or grade. Sleeve couplings allow a small amount of adjustment at those locations where they were installed.

As a basis for detailing the line, a complete control survey consisting of line and grade was made. A control traverse was established in the field with iron pins marking all P.I.'s. This was followed with a profile taken along the traverse line. At all critical points, cross sections and additional topography were taken. Location of

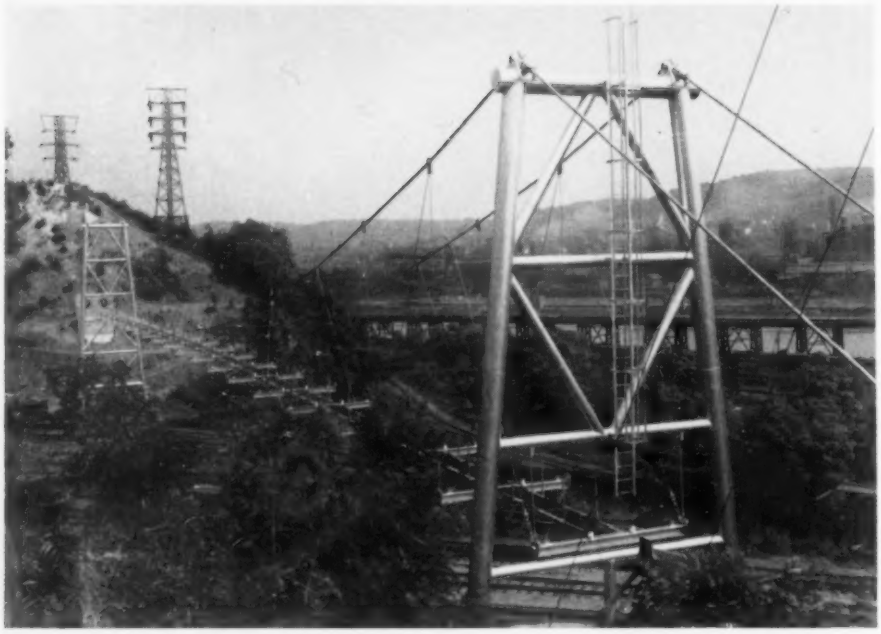


Fabrication of Type 2 drips showing perforated inner barrels and two assembled drips. To remove condensed water and heavy slugs of sludge ahead of the pigs, drips were installed in all sags. Maximum distance between drips is 2,000 feet.



In the Type 1 drip (left), an 8-inch pipe was set in the main line in such a manner that the cut section was 6 inches wide at maximum point. The 8-inch line is equipped with a hoe arrangement which allows any accumulation of heavy sludge to be pushed out of line into storage tank. Type 2 drips (right) consist of an outside sleeve placed around the section of the mainline which has been perforated with a number of 6-inch holes. Outside sleeve has an 8-inch pipe drain attached in same manner.

Tunnel under railroad tracks, showing casing, concrete crib wall, scraper launcher foundations and monorail platform piers.



Suspension bridge across Union railroad tracks at Monongahela Junction. Span is 360-feet between towers. The tallest tower is 68 feet from top of foundation to cable saddles. Main cables are 2¾-inch pre-stressed bridge strands.

TABLE 1—Design Quantities

SECTION		Total Flow MMcfd	Length in Miles	ID Inches
From	To			
Clairton	Irvin	255.00	3.4270	54.50
Irvin	National Tube	215.75	3.6334	54.50
National Tube	Duquesne Junction	165.75	0.9223	54.50
Duquesne Junction	Carrie Junction	130.00	3.0219	42.50
Carrie Junction	48" Mill Junction	109.60	0.2841	42.50
48" Mill Junction	#1 Pump House	103.60	0.2652	42.50
#1 Pump House	30" Mill Junction	96.40	0.6309	42.50

a line of this type more nearly follows highway locating practice than pipe line practice.

Above-Ground Construction Required. Of the total length of the line, approximately one-third is buried. In the beginning, the basic design philosophy was to install the pipe underground wherever possible, however, the available space dictated that it be placed above ground in many locations. In some areas it was necessary to stack the two lines to obtain clearance.

Buried sections followed conventional large-diameter pipe line practice where possible. For corrosion protection, the pipe is double coated and double wrapped with coal tar enamel, glass fiber and felt wrap at the mill. Preferred spacing of the buried pipe is 20-feet, center to center, but in some areas it was necessary to reduce this to 12 feet. Where 20-foot spacing was possible, the pipe was laid in separate ditches, but where only 12-foot separation was possible, both lines were laid in a single ditch. All changes of alignment, either vertical or horizontal, are mitered joints. Sleeve couplings, which can take changes of alignment up to 1½ degrees, were used to make fine adjustments of line and grade in the field.

Bends Held to a Minimum. Since it was necessary to miter all changes of alignment, the number of cuts required was reduced by making horizontal and vertical changes at a common point. All such cuts were calculated by the mathematics of combination or combined bends.

All miter cuts were held to a maximum of 16 degrees of centerline deflection per cut. If changes greater than 16 degrees were required, multiple miter cuts were made to form a bend of equal miters with each miter having a deflection of 16 degrees or less. The pipe tangents of this bend are tangent to a circle having a preferred radius of four pipe diameters with a minimum radius of two and one-half diameters. On-stream pigging made it necessary to hold to these dimensions.

Backfilling Required Care. It was necessary to take extraordinary precautions in backfilling to prevent forcing the pipe out of round. Since the line was designed for internal clean-

Installing 62-inch casing under railroad tracks at Coal Valley. Pipe towers for highway crossing and right of way downstream are shown.

ing, out-of-round pipe could not be tolerated. To achieve the best results, the backfill was carefully tamped up to the spring line (midway of the pipe). Above this point, the fill is lightly compacted to the top of the trench.

Design For Internal Cleaning. Designing a line of this size and in this type service for internal cleaning posed several problems. First, it was necessary to design traps for launching and receiving a pig of the size and weight required; second, the radius of curvature of the bends had to be limited; third, some method of allowing the accumulated liquids and tars to "drop out" of the line had to be found.

The major problem in designing the traps was the closure. Using a standard blind flange, with the necessarily large number of bolts required, appeared to be a poor design for operating purposes. Two of the quick opening types investigated were of excellent design, but were designed fundamentally for high pressures and were quite expensive for the maximum pressure anticipated (50 psig). The closure used was designed especially for this service. It was hinged and has a quick opening seal.

Two Type Drips Installed. Although it was known that water and various quantities of tars and resins would condense in the line, there were several unknowns which complicated the design of the drips. Some of the factors which influenced the design were:

- How much water would be in the line when scrapers were run
- Under what conditions tars and resins would deposit
- How viscous the deposits would be
- How long before the deposits would harden
- Whether any solvent would be required to aid in cleaning the line
- How large a drip would be required

These things will not be known until the new line has been in service for several years, but in the meantime, it was necessary to make the best design possible by the exercise of good judgment.

Two types of drips were designed and designated as Type 1 and Type 2. A drip was placed in all sags, with the two types alternated if at all possible. If the distance between sags greatly exceeded 2,000 feet, drips were installed at intermediate locations. The type 2 drips had to be accessible to a tank truck for removal of the sludge deposited in the storage tank. At most locations the water and sludge forming in the type 1 drips must also be hauled.

Design of the drips is unique, since they are required to handle large volumes of water and in addition must trap any heavy material which drops out of the gas during normal operations, and be able to rapidly relieve a pig of excess sludge during the cleaning operation. To accomplish this, all restrictive passages between the collection sump and the pipe line were eliminated.

All of the receiving tanks from the drips were equipped with removable pressure siphons, a line for washing or steam cleaning and a large opening which will accommodate the suction line from a lift pump.

Upstream from the Pittsburgh-McKeesport Boulevard highway crossing is hillside trench for second buried line.

Overhead Crossings. At a number of locations it was necessary for the pipe line to cross above roadways. Since the line is not required to carry a full liquid load, these crossings were made simple self-supporting spans. The major crossings are Coal Valley Road, the Irvin Works Entrance,

Curry Hollow Road crossing showing Type 2 drip at downstream end. This is starting point for buried line.

Curry Hollow Road, Homestead-Duquesne Road, and Union Railroad Classification Yard—the longest self-supported crossing on the system. Located in the 43¼-inch section, this crossing consists of seven spans of 100 feet each. This crossing was examined for both static and aerodynamic loads and found to be very lightly stressed. To reinforce the pipe against any tendency to collapse, ring girder stiffeners were installed at the supports.

Of all the overhead crossings, the most impressive is the suspension span over the Union Railroad's tracks at its Monongahela Car Repair Shop. This suspension span is 360 feet between support towers, and supports twin 43¼-inch pipes. While not extremely long for suspension bridges, there are probably very few such spans carrying twin lines approaching this size. Towers for this bridge are constructed of pipe sections; the tallest is 68 feet from top of the foundation to the cable saddles. Main cables are 2¾-inch prestressed bridge strands. Cables were prestressed at the factory with the location of all suspenders marked. The guaranteed modulus of elasticity after prestressing is 25 million.

Main cables are spaced 13 feet on centers and support a system of 8-inch WF girders spaced 18 feet on centers. Support girders are cross braced with ¾-inch tie rods and turnbuckles to provide lateral stiffness. The 43¼-inch pipes rest on 15-inch channel sections which are attached to the cross girders, acting as guides for the expansion of the lines. The entire suspension structure was analyzed for aerodynamic stability. Stresses induced by wind movement were nominal.

About the Author

Fred E. Culven, senior gas engineer for Williams Brothers Company, served as project engineer for construction of the twin gas lines. He joined Williams Brothers in January 1957 after 14 years in the Engineering Department of Panhandle Eastern Pipe Line Company. He was assistant director of research when he resigned. He received a bachelors degree in civil engineering from the University of North Carolina and a masters degree from the University of Colorado. He is a member of the American Gas Association, American Society of Civil Engineers and is a registered professional engineer.

Expansion Joints Required. The beginning section, which is subject to temperatures up to 250°F., is supported on steel towers about 30 feet above the ground. Since the usual methods of allowing for expansion were inadequate, an adjustable expansion joint was installed and the final adjustment made after the lines reached normal operating temperature. This expansion joint is a long sleeve coupling with alternate bolts extending past the coupling and fastened to a stiffener ring. After final adjustment, the line will act as though it were welded.

A similar technique was used at two other locations. The first of these was immediately downstream of the Coal Valley Road Crossing on the section located on the old Pine Run Street Car right-of-way. Since this is a very crooked section, after adjusting for expansion at normal temperatures, the pipe will be allowed to move on its supports as the temperature varies.

The second is in the 43¼-inch section. At this location, a solid welded line was considered necessary, even though the pipe supports were founded on steel piles. It is possible that the pipes might move under shifting ground conditions. A welded line can move on its supports and remain intact.

Another unusual section is the Homestead Plant Area. The lines are supported on cantilever beams which are fixed to steel pipe piling. The cantilever beams are 14-inch WF section attached to two 8-inch pipes for a back anchor and to two 8-inch pipes for the bearing support. These piles vary from 20 feet to 80 feet in length. —**The End**

Laying above-ground pipe, showing the high cantilever towers, and change from side-by-side to over-and-under stacking of the pipe.

Hollandsch Diep Crossing Completed

Numerous river, canal and dike crossings slow construction progress on the Rotterdam-Rhine 190-mile, 24-inch crude line. Including installation of one pump station, completion is expected by 1960

Crossing of the 6,000-foot Hollandsch Diep, recently completed on the Rotterdam-Rhine crude line, is a typical example of the submarine construction encountered on this 24-inch line. Construction difficulties arose from the length of the crossing and the fact that water was usually above ground level, as is the case with eight major crossings undertaken over the 190-mile right of way.

Yard-coated with a ¼-inch glass fiber wrap and enamel, pipe was covered with a 2½-inch layer of concrete before lowering-in. Two 30-ton winches and a four-part line, consisting of 1⅝-inch cable and a stationary anchor, was used for pulling the line into the Diep.

Covered with 10 feet of sand at the Diep bottom, the pipe weighed 334 pounds per foot, producing a negative buoyancy of 10 pounds per foot with the line empty. After construction was completed, the line was hydrostatically tested to two-and-half times normal operating pressure for 48 hours.

Small Dike Crossings Required Boring. Four major sea dikes will be crossed along with several railroad and highway crossings. Because of the importance of these dikes, each crossing is considered a special engineering project and handled individually. The smaller dike crossings will be constructed by boring through below the base, installing a casing and placing the pipe inside the casing.

All Pipe Must Be Yard Coated. Another construction problem is in coating pipe. Because of the numerous bends and crossings between Rotterdam and Godorf, field coating and wrapping is impossible; pipe is being yard-coated and the welded joints are wrapped at the job site by hand.

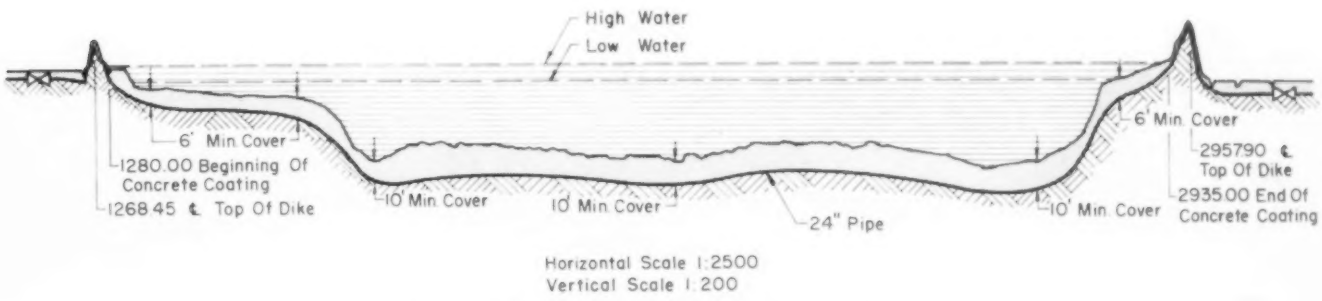
In Germany the line runs through sections where domestic and industrial waters are stored less than six feet beneath the ground.

The operating company, N. V. Rotterdam-Rijn Pijpleiding Mij, was formed by the Royal Dutch Shell Group, Caltex and Gelsenberg Mobil Oil Handels und Transportgesellscraft m.b.H. The second largest European oil line to get underway in 1958, it will carry crude from Pernis near Rotterdam to refineries in Gelsenkirchen, Cologne and Godorf.

When the line is completed in 1960, it will have a capacity of 150,000 barrels per day with the ultimate capacity set at 400,000 barrels daily. A pump station will be installed at Pernis and additional horsepower will be added at other points along the line after it has been constructed. The main line extends 100 miles from Pernis to Venlo before reaching Germany. From Venlo a 25-mile branch will be laid to Wessel on the Rhine; the trunk line continues from Venlo to the Cologne-Godorf refining area.

Construction is being carried out by N. V. Hollands-Duitse Pijpleidingsbouw, a German-Dutch consortium of six companies. Bechtel International Company has contract as engineering and construction consultant. To handle increased petroleum shipments, Rotterdam is building a $30 million port to handle tankers carrying over 45,000 tons. Dredging work began in conjunction with pipe line construction work.

—The End



Profile of 24-inch pipe line crossing Hollandsch Diep

Pre-Cambrian rock had to be blasted from the right-of-way to enable equipment to get through. A "quad-drill" makes four holes simultaneously for explosives which blasted the rock in making a five-foot ditch. Large rock outcrops and crags were characteristic of the right of way through the world's worst rock.

Trans-Canada Completes World's Longest Pipe Line

Contractors laid 848 miles of 30-inch pipe through solid rock, bottomless muskeg, and numerous river crossings

By Donald G. De Pugh
Construction Editor, PIPE LINE INDUSTRY

CONQUERING EXTREME terrain difficulties of the Pre-Cambrian rock and muskeg, and overcoming severe weather conditions, 12 contractors laid a stretch of 848 miles of 30-inch line in 1958 to complete Trans-Canada Pipe Lines Limited's gas line ahead of schedule.

More than 300 miles between Port Arthur, Ontario, and Toronto consisted of Canadian shield, an igneous granite rock. Heavy rains from June through August made the muskeg construction work and river crossings particularly tough. Pipe stringing and coating were special problems in areas where access roads were not available and where muskeg prohibited use of large equipment. During Canada's rugged winter months, temperature dropped to 48 degrees below zero.

Majestic Contractors Limited solved the muskeg hazard on its 73-mile spread east of Beardmore with a smooth riprap built along the right of way. Nicknamed "the boulevard," it was constructed by laying riprap criss-cross several feet deep and 20 feet wide. Packed with clay to give it a strong foundation, the riprap was covered with sand and gravel providing a smooth road that cars could traverse at 40 mph.

In the solid rock sections, drilling, blasting and clearing the right of way had to be completed before any ditching was made. Rotary ditchers could not be used for trenching in several sections of the line. After coating the pipe, rock shield was applied and sand bag padding was laid in the bottom of the ditch for further protection.

In most cases lowering-in was completed by the tie-in gangs except in cases where dope gang lowered pipe which had been coated the previous day before completing wrapping. In the difficult river crossings, more than 100,000 river weights were used. Conventional split-collar weights were used on segments buried where there is permanent flow. Unusual weighting material was introduced on Mannix's spread between Ameson and Kapuskasing, Ontario. Using iron ore as the aggregate, the weight produces five tons with the same volume in place of three tons with ordinary reinforced concrete.

Snowmobiles String Pipe. Stringing pipe in the muskeg, Majestic Contractors and Grayco Constructors Canadian Limited made use of small snowmobile tractor type flat bed carriers which could easily move through muskeg and along the riprap. Crawler type wagons also were employed in most sections to string pipe. On the backfill, shedders, consisting of split casing slightly larger than the pipe, were pulled along just above the line as backfill was pushed onto the pipe. These shedders prevented rock in the backfill from damaging the coating. To speed up welding, Mannix worked with a small pipe gang going ahead

of the main crew to make the stringer bead and two hot passes.

The downstream side of compressor station sites was coated with a new type of cold dope by Majestic Contractors. It required no wrap and was applied after a wax primer coat. On its level 63-mile spread between South River and Bracebridge, Price-Poole double-jointed most of the pipe. Ditching through rocky terrain, Price-Poole used a backhoe ditch crew, wheel ditchers and wagon drills.

Majestic's spread from Potter's Corners to Kirkland Lake was a typical example of the muskeg, rock problems encountered. A third of this 83-mile section was muskeg and over 20 miles included Canadian Shield. Excellent access to right of way and good riprap lessened contractors worries. Although only 10 miles of the ditch in rocky terrain were dug with rotary ditchers, and muskeg was bottomless Majestic averaged better than a mile a day. Three major pushes, the largest 6,000 feet, worked smoothly. Using double twin arc welding units and an air powered internal line-up clamp, the pipe gang laid up to 10,000 feet a day in the upland country. Contractors used the standard snowmobile to a great extent on riprap and river crossings to tow welding machines, carry timber and string river weights.

A special feature on Oklahoma Pipe Line Constructors Limited 92-mile spread from Bracebridge to Maple was the use of hydraulic counter-weight controls on sideboom tractors during coating operations. Shop fabricated convex treads of extra width were made for walking over swamps and peat bogs. Tie-ins on this section averaged 5 and 6 with a peak of 10 per day. Because of the good terrain this was the only spread where welding machines could be mounted on a truck.

Station Construction. Construction of five compressor stations at strategic points on the 2,290-mile line also was completed in 1958. Three stations with three 10-cylinder 3,400-horsepower engines were installed at Burstall, Caron and Moosomin in Saskatchewan. At Ile des Chenes, Manitoba, three 10-cylinder, 2,500-horsepower units were installed and at North Bay, Ontario, three 1,800-horsepower engines make up the smallest station. Trans-Canada used a new type panel in constructing station walls. Combining extremely light weight with high weather resistance, the panel consists of 1½ inches of polystyrene with a ⅛-inch flat asbestos board on each side.

Contractors on the main line section included Nelen Ltd., 63 miles; Morrison-Shivers Ltd., 110 miles; Majestic Contractors Limited, 154 miles; Canadian River Construction Ltd., 93 miles; Mannix Co. Ltd., 93 miles; Grayco Constructors Canadian Limited, 82 miles; Dutton-Williams Brothers Limited, 57 miles; Canadian Bechtel Ltd., 47 miles; Price-Poole,

Initial welds are made on the 30-inch pipe near Bernard Lake in Northern Ontario. Pipe coating was protected from rock backfill which can be seen to the right of the ditch. Sand bag paddings were placed in the bottom of the rocky ditch for further protection.

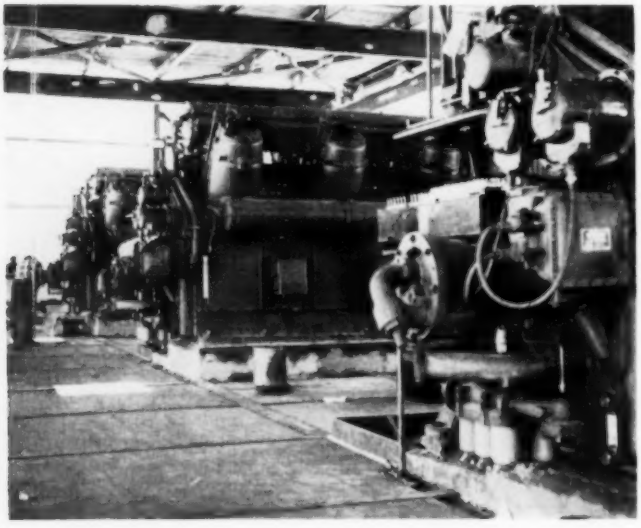
Three side-boom tractors lower coated and wrapped 30-inch pipe into ditch near Nipigon, Ontario. The line consists of 34-inch pipe from Saskatchewan-Alberta border to Port Arthur, Ontario; from there to Montreal it is 30-inch.

63 miles, and Oklahoma Constructors Canada Limited, 92 miles.

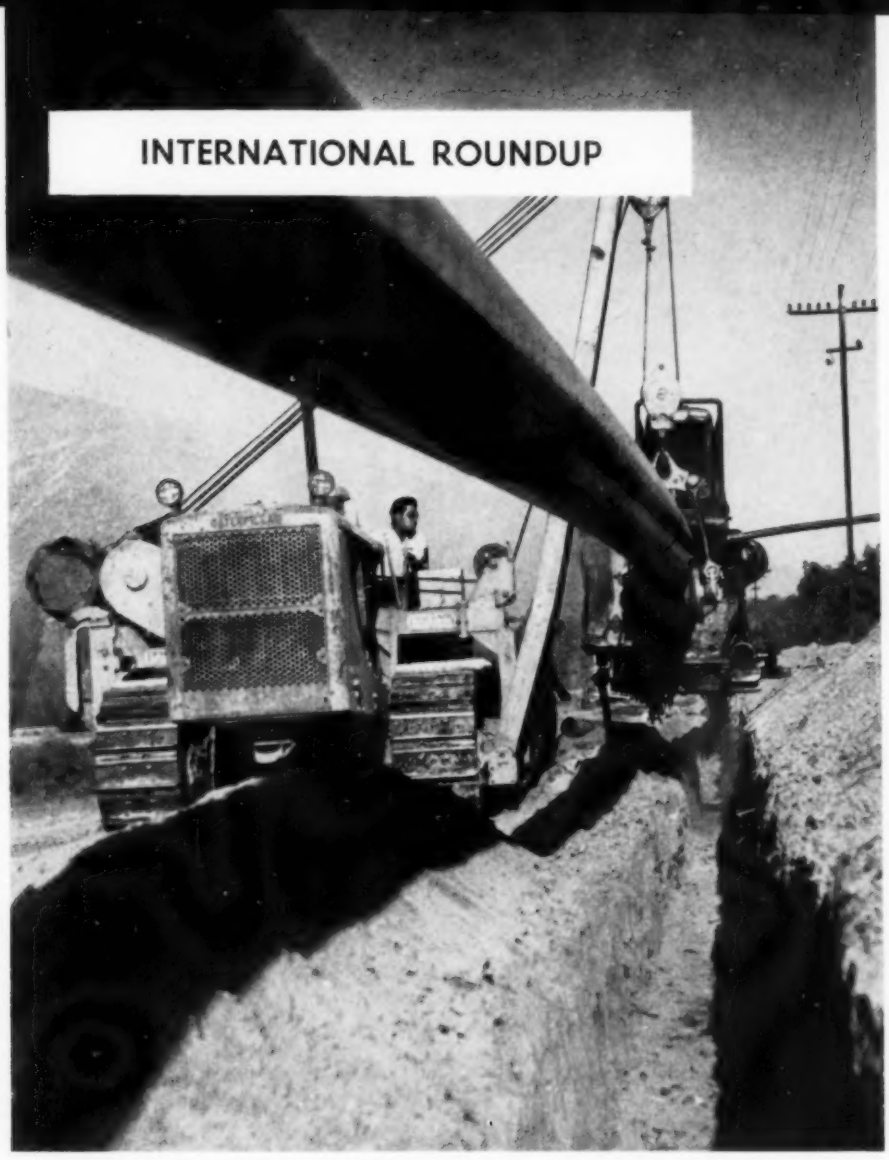
The world's largest line, Trans-Canada's $375 million project was completed in three years. Extending from Burstall, Saskatchewan, to Montreal, the 34- and 30-inch line will deliver about 265 MMcf of gas daily to points along the route. Construction plans call for the installation of an additional 22 compressor stations. Trans-Canada will move 820 MMcf of gas daily in its fifth year of operation. —**The End**

A stretch of rolling farm land (right) near Trout Creek in northern Ontario provides a break in the rock and muskeg terrain. Initial welds have already been made and line welders are working toward the hill. Contractors laid up to two miles a day over smooth terrain.

Churn drills are making shot holes in one of three channels to be crossed at the Winnipeg River near Kenora. The line also crossed two islands in the river, blasting every inch of the ditch through solid rock.



Welder (above) puts final weld on 34-inch pipe as Trans-Canada line moves eastward. Construction crews worked in temperatures as low as 48 degrees below zero in order to complete the line on time. Final weld on the line was completed October 24, ahead of schedule.
(Left) Trans-Canada installed five of its planned 27 compressor stations in 1958. Horsepower varied from 10,200 at stations in Burstall, Caron and Moosomin, Saskatchewan to 5,400 at North Bay, Ontario.



Primer enamel, fiber glass and outer wrap are applied to the 24-inch pipe before lowering-in as construction progresses on the southern section of the Pemex-to-Mexico City line. From the lowlands in Tabasco, the line climbs to 7,500 feet at Mexico City.

Rugged Terrain Makes Pemex Line Difficult

Swamps, rains, mountains and rocky terrain provide construction obstacles on 500-mile, 24-inch gas line from Pemex to Mexico City

By M. Saint Albans, Mexico City

DESPITE THE natural hazards of Mexico's rugged terrain in Tabasco, Petroleos Mexicanos is moving ahead on construction of the country's longest pipe line—a 500-mile, 24-inch, gas line from Pemex, Tabasco, to Mexico City. Swamps, lagoons, flooding rivers, rocky terrain, mountainous country and snakes present obstacles that Pemex must overcome to complete the line by 1960. Nearly 65 miles of the line through the southern lowlands is being constructed without any right-of-way clearing.

Right-of-Way Problems. Contractors Ruben Flores, CUPSA, Morton Arocha, and Compania Omega have completed the 50-foot-wide right of way from Pemex to Minatitlan, a distance of 143 miles. Work on this section was hampered by the nine-month rainy season and the humid heat which at times reached 110°F. Flores cleared a 10-mile section of the right of way without the aid of heavy machinery. Workers, waist-deep in water, had to cut down trees with motor saws and axes, and chopped them into smaller pieces for moving. Dumping on the edge of the morass, trucks gradually built up a base on which to advance.

As a result of many morasses and lagoons between Pemex and Tierra Blanca, Veracruz, over 65 miles of the route consists of spreads handling construction by laying a corduroy road over which a tractor and winch can pass in order to pull and lower the pipe. The snake-infested areas in the lowlands necessitate that serum always be within a few feet of crewmen. Inspection engineers also keep the serum handy when making inspection tours in this territory.

All main line pipe is 24-inch, API Grade X-52, 0.344 wall thickness electric weld. Dual crossings of 12¾-inch seamless pipe will be used at all rivers. Pipe is being field-coated with an primer, enamel, fiber glass and outer wrap. Segments of the line extending through the swamps and lagoons, as well as river crossings, will be concrete coated. Since Tabasco is devoid of gravel, concrete has to be shipped from Minatitlan for use on southern crossings.

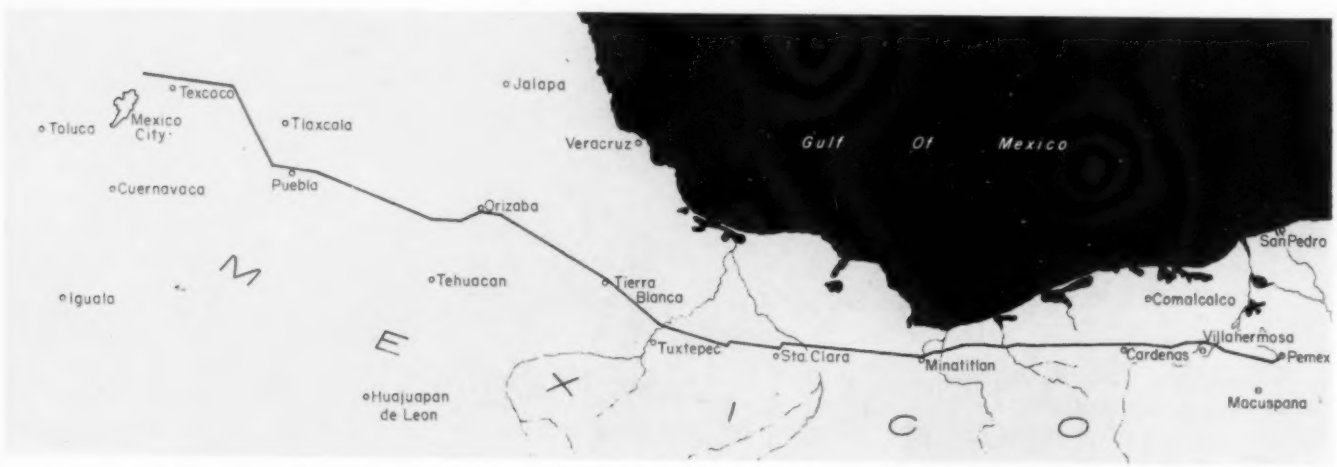
Numerous River Crossings. Eight river crossings impede construction progress in the flooding areas of Tabasco-Veracruz. The line crosses the Grijalva, Rompido de Samaria, the Mexcalapa, and Tonala in Tabasco. Seven miles east of Minatitlan, Pemex will cross the Coatzacoalcos on the Isthumus of Tehuantepec. Lateral lines will be laid from this area to deliver gas to Minatitlan industrial plants. Within a span of 40 miles, the San Juan, Tesechoacan and Arroyo Obispo rivers will be crossed. These waterways are about 1,000 feet wide

A bulldozer is used to fell a ceiba tree as right of way moves through tropical forests in Tabasco's lowlands. Building the right of way through the swamps required laying a foundation of several feet of dirt to enable trucks to move. Some sections had to be cleared without aid of machinery.

in dry months, but widen to nearly 10 miles during the rainy season. Pipe will be laid when the river is down and river clamps will be applied to the section on dry land. The swamps end at Tierra Blanca and from there to Orizaba, smoother right of way will hasten construction.

Beyond Orizaba begins a 60-mile stretch of rocky terrain. Compressors, rock tools, and blasting with dynamite are necessary for trench-digging in this solid rock section. Another major obstacle for Pemex is the Cumbres de Maltrata mountain. In about six miles, it gains almost one-mile in altitude with some grades up to 40 percent. There will be no trenching there. Instead, pipe will be embedded in concrete supports three feet above the ground. For safety, Pemex engineers designed the supports with posts extending three feet above the pipe. Similar supports are being used in parts of the Omealca-to-Orizaba 22-mile section, which includes a climb of nearly one-half mile. In addition to the river crossings, there are 50 railway crossings, 30 paved highway crossings and over 100 country road crossings.

Compressor Stations Planned. The line is designed to carry 220 MMcf of gas daily without the need of a compressor station. Initial flow to be delivered to Mexico City sometime in 1960 will be 175 MMcf daily; 45 MMcf will be supplied to industrial plants along the line. Some months after completion of the system, plans call for installation of two 7,000-horsepower compressor stations, one in Orizaba and the other closer to Mexico City. These stations will increase daily capacity to 300 MMcf. As more gas is made available, more compressor stations will be constructed. —**The End**



Route of Petroleos Mexicanos' 500-mile, 24-inch gas line from Pemex, Tabasco, to Mexico City.

WHERE THERE'S BUSINESS ACTION THERE'S A BUSINESSPAPER

Some blessings we take for granted. Like ice cubes. Or indoor plumbing. However, older men—wiser men—say a little prayer of thanks for things they know they couldn't do without.

Among these wiser men are the men who make top-level decisions in business.

To make decisions, they must have facts. All the facts. All the pertinent information they can get. And they get a major portion of that information from one unique source: the business publications they subscribe to.

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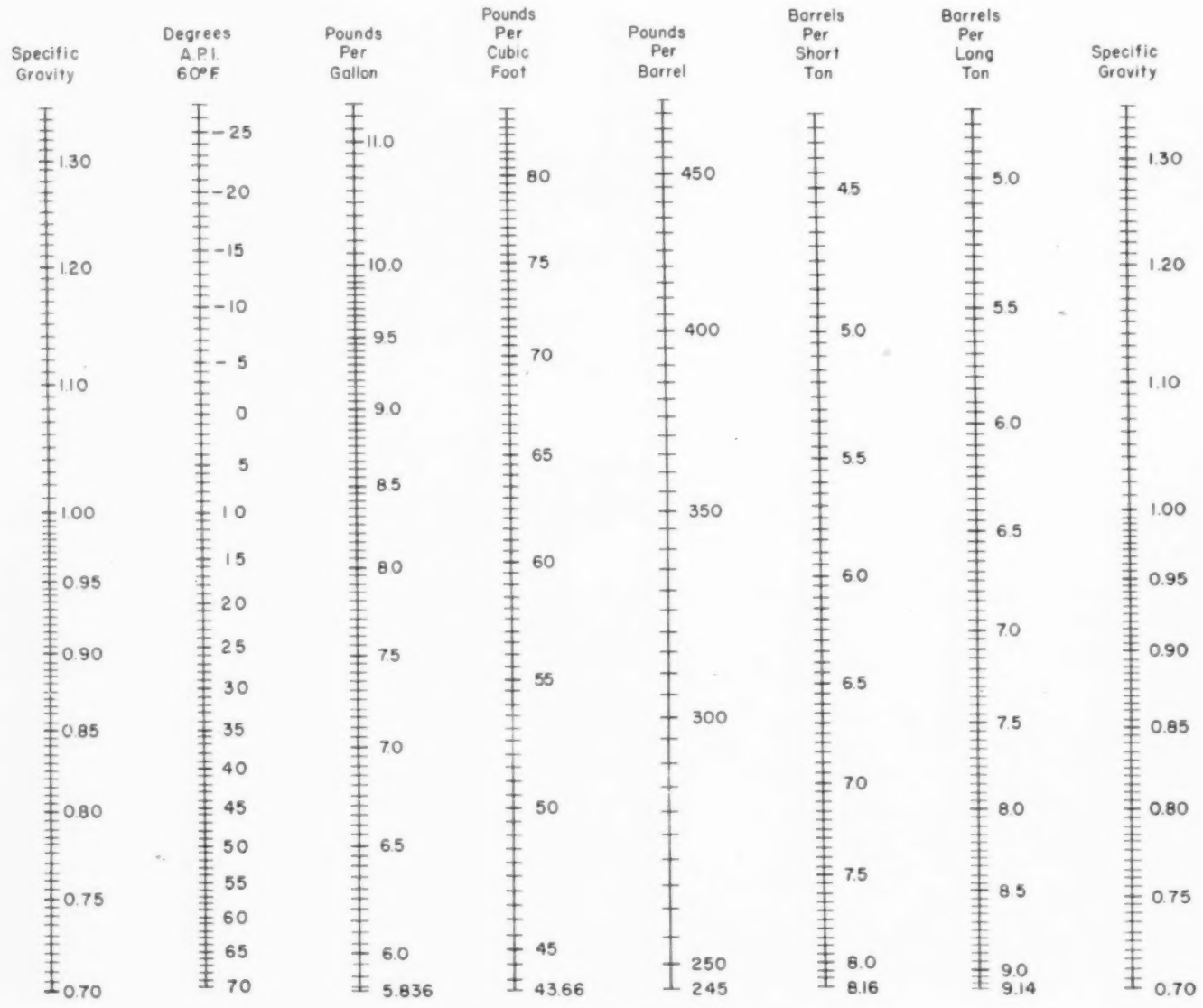
These practical aids give quick, reasonably accurate answers to design, maintenance and cost estimating problems. PIPE LINE INDUSTRY will pay $25 for each chart, nomograph or data sheet published—$15 for each Rule of Thumb. Send your ideas to PIPE LINE INDUSTRY, P. O. Box 2608, Houston, Texas

Engineering Design

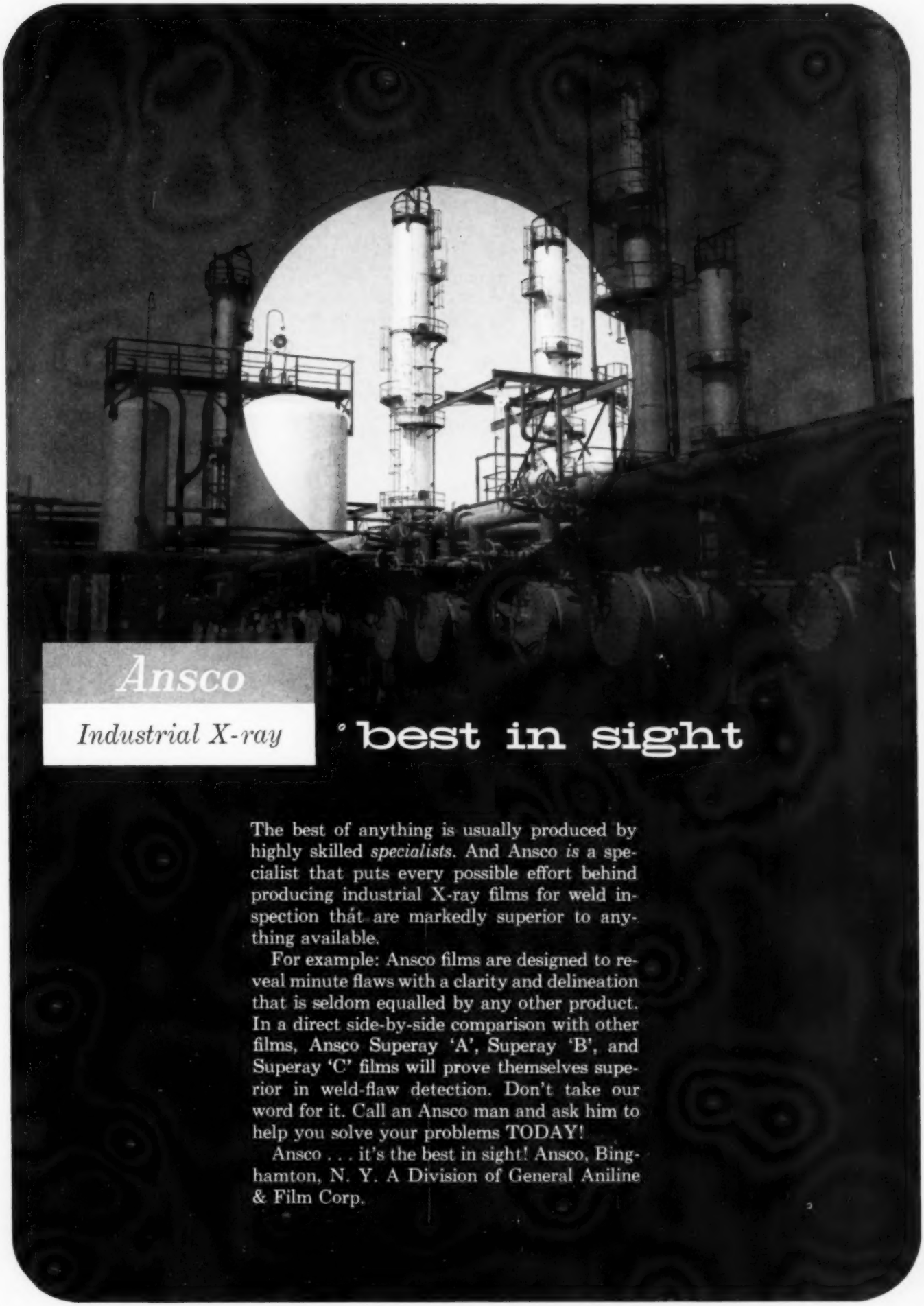
—59—Liquid Gravity and Density Conversion Chart

This line chart provides an easy method for converting units of liquid gravity and density. Draw a horizontal line perpendicular to the scale line through a known value and read the equivalent value on any other scale.

Submitted by
Marvin H. Green
Philadelphia, Penn.



LIQUID GRAVITY AND DENSITY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"We can't afford delays, and our new Ford T-700 provides the round-the-clock dependability we need.

"Our '59 Ford often runs 24 hours a day to meet the demanding schedules of this business. We haul six types of oil well testing equipment for both offshore and onshore work, and there's always a race against time on every job.

"This portable testing equipment is a big load, and one that pulls hard on the highway. At the wellhead, we often hit especially tough going. We stick with Fords for this work because our experience shows they do the best job, and do it fast and economically."

GO FORD-WARD for savings with '59 Ford Trucks!

Whatever your job . . . wherever you do it —you'll find Ford trucks are engineered and built to do it better! Whether you need a 4-wheel drive pickup like the one shown below—or a heavy-duty tandem similar to the one used by the Stooksberry Tank Co., you'll be *ahead* with a Ford. And for '59, there are even more reasons to invest in a Ford Heavy or Extra Heavy. You'll discover:

Greater operating economy with new, faster rear axle ratios and wider choice of transmissions.

More efficient parking brake of the internal expanding type has approximately 50% greater stopping and holding ability, requires less than half the operating effort needed for the previously used type.

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Yes, the new '59 Fords are here to take you *Ford*-ward for savings, *Ford*-ward for modern style and stamina. See your Ford Dealer today!

New Ford 4-wheel drive trucks available in ½- and ¾-ton pickup, stake and chassis-cab models. Ford-built at Ford's low prices. Available early 1959.

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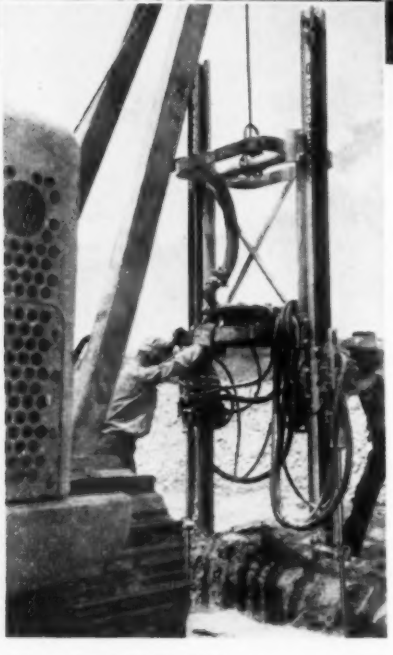
600-CFM GYRO-FLO COMPRESSOR – Hooked-up behind the boom cat, this husky rotary unit provides a completely self-contained air power plant with ample capacity for operating the two heavy-duty drills. It can go anywhere, and stands up under the most severe temperature and climatic conditions.



I-R DUAL-DRILL RIG – Mounted on a sturdy steel frame suspended from the tractor boom, this dual rig drills two accurately-spaced holes at a time. Powerful drifter-type drills with air-powered feed and retraction make short work of pipe-line drilling. Single manifold connection, built-in air line lubricators and simple, centralized controls are designed specifically for this type of work.

This I-R Combination pays off on

FOUR CORNERS PIPE LINE

When A. P. Vaughn Contractors started work on Section 1 of the Four Corners Pipe Line—a 76 mile spread of 16-inch line from Aneth Field in Southern Utah to Kayenta, Arizona—they knew the going would be rough on men and equipment. The area is hot, dry and dusty. And operations would be carried on more than 100 miles from the nearest field office. Drilling equipment would have to stand up, day after day under a boiling sun and hot, wind-blown sand.

So they assigned their top teams to the job – Ingersoll-Rand Gyro-Flo portable compressors and PLM Dual Drill Rigs. With this equipment drilling 4-foot holes, two at a time, the line has been advanced at the rate of about a mile a day.

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AN UNBEATABLE COMBINATION...GYRO-FLO COMPRESSORS AND I-R ROCK DRILLS

WHAT'S HAPPENING

IN PIPE LINE CONSTRUCTION

By Donald G. DePugh, Construction Editor

No Hoosier Pole on Florida Line Wrap Machine

This coating and wrapping machine applying polyethylene tape on a section of Houston Texas Gas & Oil Corporation's Baton Rouge, La.,-to-Cutler, Fla., line features a "bridle" which stabilizes the machine and eliminates need of a "hoosier" pole. Construction of the Texas-to-Florida line will be completed in late spring. The Coastal Transmission Corporation section of the line, from McAllen, Texas, to Baton Rouge, is being coal-tar coated.

Coastal Transmission Lets Contracts On Main Line and River Crossing Work

Coastal Transmission Corporation recently awarded three contracts on its main line from McAllen, Texas, to Baton Rouge, La. River Construction Corporation was awarded 104 miles of 24-inch between Sulphur, La., and Smith Point, Texas. Coastal also awarded contracts on main river crossing projects. Brown & Root will lay the 24-inch submarine line across the 58,000-foot Galveston Bay and Buddy Sherrod, Inc., will construct a 24-inch 3,000-foot line across the Neches River near Beaumont.

Parson Company was awarded a contract to build 90 miles of 3- to 14-inch lateral lines in the Corpus Christi area. Coastal plans to let contracts on the final segment of its section of the Texas-Florida line this month.

Houston Texas Gas & Oil Corporation, building the portion from Baton Rouge to Florida, is making steady progress on its construction. The $161 million system is expected to be in operation by June. Initial capacity of the line will be 282 MMcf of gas per day. Coastal also plans to purchase a 46-mile gathering system in Corpus Christi area from Sun Oil Company to obtain more gas.

Transco Awards Contract To Glaser Construction

Glaser Construction Company will lay 37 miles of 20- and 24-inch gas lines for Transcontinental Gas Pipe Line Corporation in St. James, Terrebonne and LaFourche parishes, Louisiana. This is part of Transco's 1958 expansion program.

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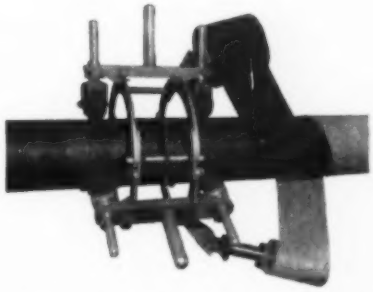
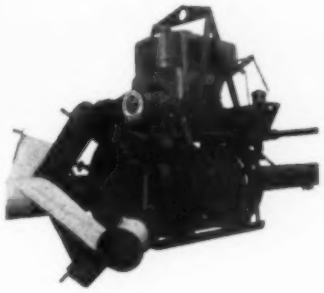
For More Dependable Equipment and Service

HERE ARE MACHINES THAT BRING ADDED EFFICIENCY TO YOUR TAPING AND CLEANING AND TAPING.



The MYOCO Tapemaster can use four arms to give any combination of tape and kraft or felt. Six various size machines available for ½" through 36" pipe; small machines use tape from ½" width through 9", large machines use 9" through 18" tape.



MYOCO Model OW Power Driven Cleaning and Taping machine combines two operations for increased speed of operations with less equipment. Line travel machines are available to handle pipe sizes 3" to 6", 6" to 12", and 14" to 20". A Wisconsin Model Vg4D V-type 4-cylinder heavy-duty air cooled engine, combined with the design and engineering features of this machine, guarantees uninterrupted service.

When you use MYOCO pipeline equipment, you quickly find that servicemen are experienced and available twenty-four hours a day, with fast transportation available to serve you in any way; efficient equipment operation is assured by periodical checks; and if possible, parts and supplies are shipped the same day ordered.

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Developed especially for cross-country work, and other big trenching jobs Parsons new 420 Trenchliner® has the extra capacity needed to profitably handle your big work schedules. Digging from 36 to 52 in. wide at depths to 7½ ft., this heavy-duty wheel-type machine produces up to 25 lineal feet of trench per minute. For more facts on this big production 420 Trenchliner call Parsons distributor *now*, or write. Other Parsons wheel-types include smaller 130, 150, 170 and larger 520.

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TRENCHLINERS for PIPELINERS

North Carolina Awards Contracts on Gas Line

North Carolina Natural Gas Corporation has let contracts for construction of its 600-mile system to serve North Carolina.

Somerville Construction Company was awarded a contract to lay 160 miles. The remaining portion of the line will be constructed by J. P. Neill Company, 116 miles, and C. N. Flagg & Company, 101 miles. Distribution lines will be laid by Panama Williams, Latex Construction Corp., Engineering Construction Company, and Somerville.

Transco's Third Hudson River Crossing Begins

Transcontinental Gas Pipe Line Corporation recently began construction on its third crossing of the Hudson River. The dual crossing of 24-inch pipe is expected to be completed by April.

The first Transco Hudson crossing was in 1950 at 134th Street, the second in 1952 across the Narrows from Staten Island to Brooklyn; the third crossing is between North Bergen, N. J., and 72nd Street in Manhattan.

Part of Transco's $167 million expansion program of 1958, the crossing extends about 4,200 feet. Maximum water depth is 50 feet; trench will be about 25 feet deep and 20 feet wide.

Iran Plans 140-Mile Line From Gashsaran to Shiraz

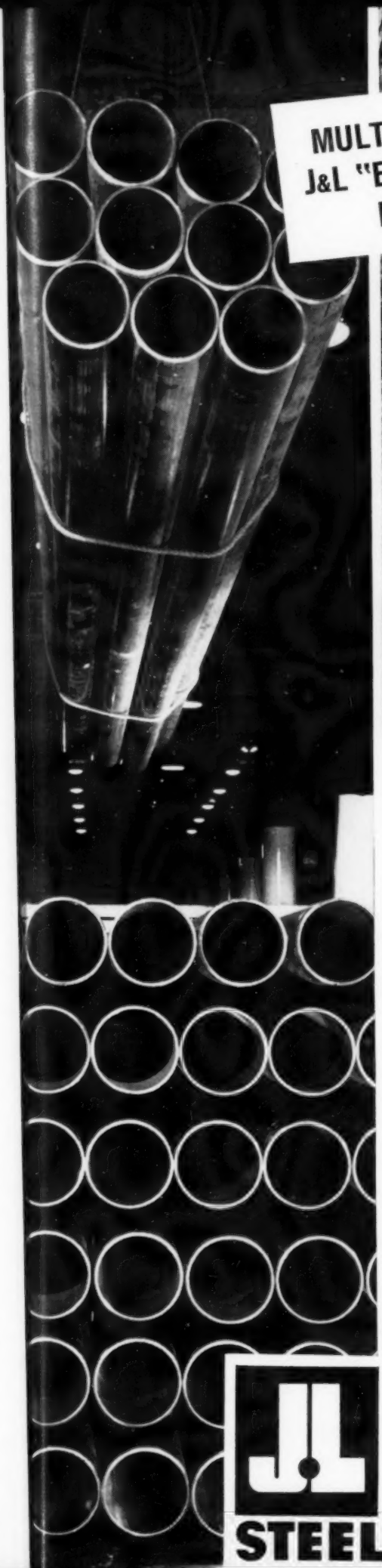
Iranian Government has signed an agreement with Montecatini for construction of a 140-mile gas line to supply a proposed nitrogen fertilizer plant near Shiraz.

The $30 million joint program will be constructed by the British-French Consortium, ENSA; the consortium will also supply gas for the new plant.

Standard Oil of Indiana Builds Products Line

Standard Oil Company of Indiana has started construction on a 23-mile products pipe line west of Chicago to a new terminal near O'Hare Field.

The 8-inch line is expected to be in operation by June. It connects with an existing line that services the company's Chicago terminal. The



MULTIPLE-TESTED J&L "ELECTRICWELD" LINE PIPE

J&L's 12¾-inch Electricweld line pipe was used in 22 miles of this Cherokee Pipe Line Company line.

"J&L Electricweld pipe bends readily to contours, is easy to weld"

. . . reports Pipe Line Service Company

Twenty-two miles of J&L's 12¾-inch O.D. Electricweld line pipe were installed by the Pipe Line Service Co., Seminole, Okla., in this line for the Cherokee Pipe Line Co.

"Our pipe must be uniformly round, bend readily to correct contour, and weld easily," says this pipeline contractor. "J&L pipe meets our specifications. It enabled us to avoid delays on this job over hilly terrain."

Electricweld line pipe is produced by Jones & Laughlin, an integrated steel company, under most rigid quality controls. Weld area of the steel is blasted with steel grit under 100 psi in a "Vacu-Blast" unit to clean the surface for perfect contact with the welding electrode.

During the electric resistance-welding process, electronic controls maintain exact welding heat at all speeds. After welding and trimming, pipe passes through an induction annealing unit to assure uniform grain structure in the weld area.

Every length of pipe is thoroughly checked through visual examinations, hydrostatic tests, flattening tests and magnaflux inspections. All Electricweld pipe is manufactured and tested in strict compliance with appropriate A.P.I. and A.S.T.M. specifications.

Electricweld pipe is available from 6⅝ inches through 12¾ inches and in lengths to 60 feet. Get the facts on this superior quality line pipe from your distributor, or write to Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pa.

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Few organizations can compare with Houston Contracting's experience over all types of terrain. From marshland to mountain, across river or plain this experience can mean the difference between completion and *completion ahead of schedule.*

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new products line will be able to transport over 1.3 million gallons per day.

Contractors for the pipe line and terminal are Midwestern Contractors Inc., J. C. Harris & Sons, and General American Transportation Corporation.

NATO Announces French Pipe Line, Storage Projects

Two projects in France have been announced by NATO. One calls for construction of a petroleum depot in Laon region, laying of 14- and 16-inch petroleum pipe lines, and cathodic protection of 434 miles of line. The other, estimated to cost $330,000, calls for boiler and pipe line works at the Solenzara air field.

Sun Oil Company Plans Gas Processing Plant

Sun Oil Company announces plans to construct a natural gas processing plant in the Laverne field of Harper County in western Oklahoma. J. F. Pritchard Company has been awarded a contract to build the $3.5 million plant. To be completed by July, the plant will process 100 MMcf of gas daily and may expand to 150 MMcf later. Gas-fired turbines will be used for generating power and process heat.

Service Pipe Line Lets Contract to Snelling Co.

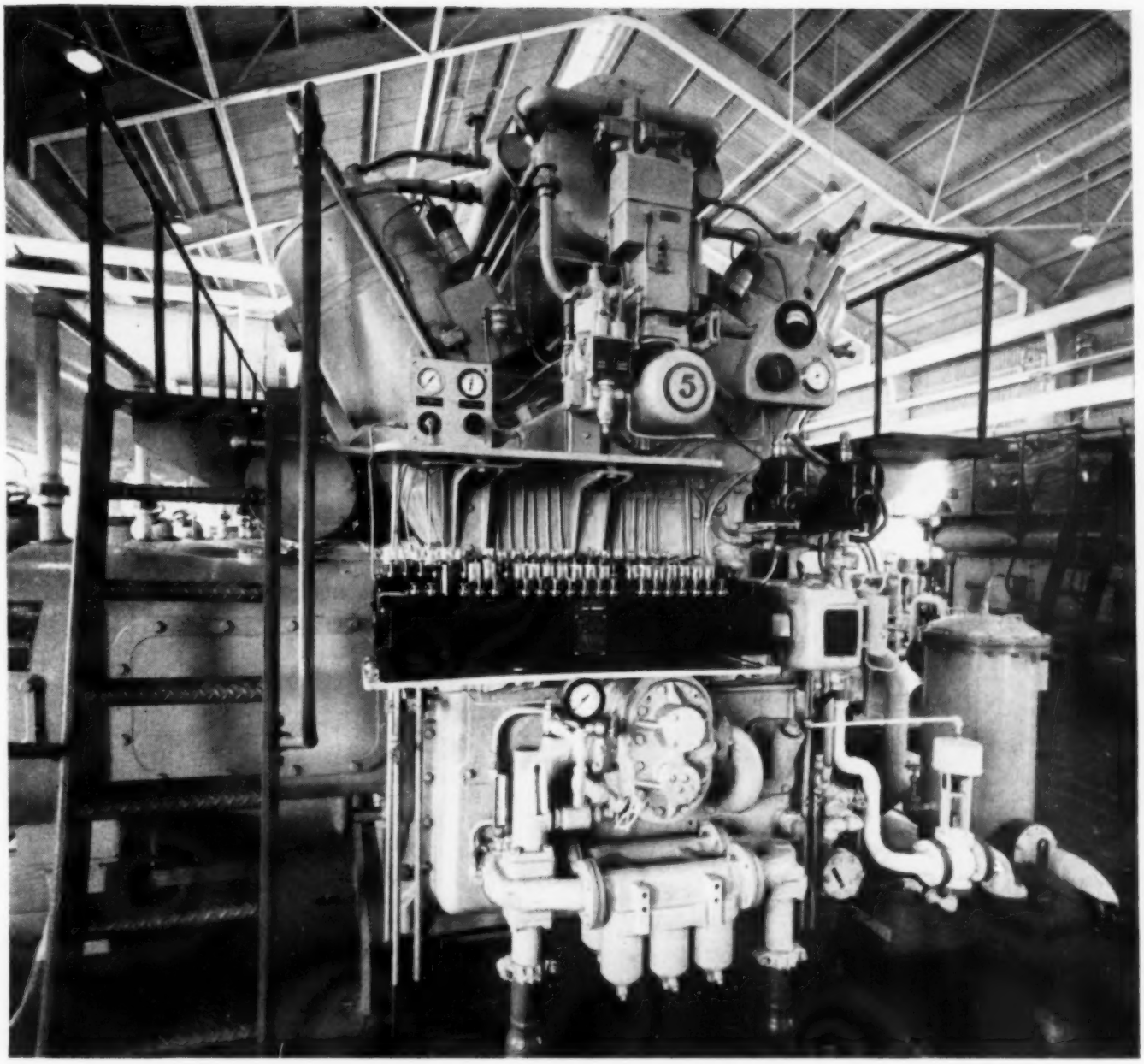
Service Pipe Line Company has awarded a contract to Snelling Company for construction of 22 miles of crude lines in Miller, Columbia and Lafayette counties, Ark.

Editorial Index Now Available

The Editorial Index is now at the printers and soon will be ready for distribution. The 1958 Editorial Index provides a time-saving entry into all 12 issues of PIPE LINE INDUSTRY published in 1958.

Bound in a handy pamphlet form for easy accessibility, the Editorial Index lists each and every article and its author. To get a copy, write Librarian, Gulf Publishing Company, P. O. Box 2608, Houston 1, Texas. Or, if you prefer, check the square provided on the blue Reader's Service Card at the back of this and every issue of PIPE LINE INDUSTRY.

Be assured of getting your copy by ordering your Editorial Index now. The supply is limited.



BENDIX MAGNETOS SPARK COOPER-BESSEMER ENGINES FOR EL PASO NATURAL GAS

Once again, Bendix* ignition equipment is proving its worth to the petroleum and natural gas industries. Shown here is a Bendix LAR magneto and Hi-V transformer coil installation at El Paso Natural Gas Company's Blanco Station in San Juan County, New Mexico. El Paso uses eight 1350 hp. Cooper-Bessemer gas compressors, all equipped with Bendix magnetos, at its mainline gas booster station.

Bendix LAR magnetos deliver dependable ignition at the lowest practicable cost. Even under the most adverse operating conditions, their reserve power ensures smooth engine performance. The Bendix LAR magneto and Hi-V transformer coil form a matched ignition system to handle rugged engine requirements.

LA magnetos now in service can easily be converted to the modern Bendix LAR type with conversion kits now available. They can be obtained from your Bendix ignition distributor or from the factory. For complete details, write SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION, Sidney, New York.

*REG. TRADEMARK

Scintilla Division
SIDNEY, N. Y

Bendix
AVIATION CORPORATION

PROPOSED PIPE LINE CONSTRUCTION

Here in convenient summary form is Pipe Line Industry's listing of company, line size, length, service, location and project status.

U. S.

Arkansas Industrial Pipeline Corp., Shreveport, 130 miles, 18-inch, gas, Perla-to-Helena, Ark., $9 million, planned.

Arkansas Louisiana Gas Co., Shreveport, 100 miles, 16-inch, gas, from near Clarksville-to-Jones Mill, between Malvern and Hot Springs, Ark., $6 million, planned.

American Louisiana Pipe Line Co., Detroit, two 12,000 hp compressor stations in Ohio and Indiana; additional 2,000 hp at existing stations in Mississippi and Tennessee; 3 miles pipe line, meter station in Cameron, La., $7 million, FPC authorization.

Chicago District Pipeline Company, 52 miles, 30-36 inch, gas, from Natural Gas' proposed line at Joliet to Chicago, $13 million, before FPC.

Cities Service Gas Company, Oklahoma City, 106 miles, gas, gathering, in Montgomery, Allen, Franklin, Miami, Johnson, and Wilson counties, Kansas, 3,600 hp to Blackwell station, Kay County, Kansas, FPC authorization.

Coastal States Gas Producing Co., Corpus Christi, Texas, 289 miles, 14 and 18-inch main line and gathering system, McAllen to Falfurrias, Tex., area, and Lopena to La Salle County, $12 million, planned.

Coastal Transmission Corp., Houston, 574 **miles, 22-24 inch, gas, from McAllen, Texas to Baton Rouge, La. connection of Houston, Texas Gas and Oil plus 414** miles of laterals, $55 million, contracts let on compressor stations to Gasoline Plant Construction Corp. Contract let on 650 miles, main and laterals, to Oklahoma Contracting Co., and O. R. Burden Construction Corp., River Construction Corporation, Parson Company, Brown & Root, and Buddy Sherrod, Inc.

Colorado Interstate Gas Co., Colorado Springs, 140 miles, gas, Green River, Wyo.-to-Provo, Utah; 109 miles, 26-inch, Texas Panhandle to southeastern Colorado; 136 miles, 34-inch, southeastern Colorado-to-Pueblo, Colo.; 107 miles, 30-inch, Pueblo-to-Denver, $91 million, before FPC.

Conn-Mass Pipe Line, Inc., Orange, Conn., 88 miles, 8 inch, products, from Boston to Springfield, Mass., considered.

133 miles, 16-inch, products, from Linden, N. J. to Hartford, Conn., considered.

62.2 miles, 8-inch, products, from New Haven, Conn. to Springfield, Mass., considered.

38 miles, 6-inch, products, from Waltham, Mass. to Fitchburg, Mass., considered.

Consumers Power Co., 45 miles, gas, main line, from Woodbury station to Laingsburg Junction, Mich., planned.

126-miles, 26-inch, gas, main, Michigan-Indiana border to Plymouth, Mich., planned.

El Paso Natural Gas Company, El Paso, 216 miles, 26 to 34-inch main line, 533 miles, 6-20-inch laterals, gas, 86,750 compressor hp; 126 miles, 30-inch main line, 266 miles, laterals, gas, 28,920 compressor hp in new and existing stations in Arizona, New Mexico and Texas, contracts let on 819 miles to R. H. Fulton & Co., McVean & Barlow, Inc., Western Pipe Line, Inc., Eastern Pipeline Contractors, and Engineers Limited Pipeline Co.

400 miles, 34-inch, Salt Lake City, Utah, to California border, planned.

Equitable Gas Company, Pittsburgh, Penn., 11.7 miles of storage pipe line and other facilities, $2,091,430, authorized.

Everglades Pipe Line Company, Miami, Fla., 35 miles, 10-inch, products, Port Everglades to Miami International Airport, $2.5 million, planned.

Gillette Pipeline Co., Cheyenne, Wyo., 103 miles, crude, from Dead Horse Creek field to Casper, Wyo., planned.

Great Northern Railway, St. Paul, 400-600 miles, 12-20 inch, crude, from Williston Basin to St. Paul-Minneapolis and Duluth-Superior areas, considered.

Gulf Interstate Gas Co., Houston, 12.8 miles, 6 and 20 inch, gas, loop line in Louisiana, $730,000, authorized.

Gulf Pacific Pipe Line Company, 1,600 miles, 30-inch, gas, Louisiana to California border, considered.

Gulf Resources, New York, 125 miles, gas, gathering system, from Lopena area in Zapata County to a point in La Salle County, Texas, planned.

Humble Oil & Refining Co., 250 miles, 26 or 30 inch, gas and 116 miles, main gathering system, varying sizes, from southwest Texas to Houston, plus gas processing and cycling plant near Corpus Christi, $75 million, planned.

Iron Ranges Natural Gas Co., 115 miles, gas, from Itasca and St. Louis counties along route of Mesabi range from Grand Rapids to Aurora, Minn., $5 million, before FPC.

Katy and New York Central Railroads, 2500-mile, 10-12 inch, LPG, from Houston, Texas, to New York, considered.

Manufacturers Light and Heat Co., Pittsburgh, Penn., 21-miles, gas facilities in Pennsylvania and West Virginia, $1 million authorized.

34-miles, 20-inch, in Greene, Adams, and York counties, Penn., authorized.

Michigan Gas Storage Co., Jackson, Mich., gas, facilities in central Michigan, $2 million, authorized.

Michigan Wisconsin Pipe Line Co., Detroit, 621 miles, gas, 14,280 additional hp, $32 million, appeal before FPC.

20.5 miles, 24-inch, main line loop in Michigan, before FPC.

Midwestern Gas Transmission Co., Houston, 350 miles, 30-inch, gas, Portland, Tenn. to Joliet, Ill., $50.8 million, before FPC.

Mookl Chemical & Gas Corp., Tulsa, and Missouri Transmission Corp., Springfield, Mo., 425 miles, 16-inch, gas, from Oklahoma City area to St. Louis, before FPC.

New York State Natural Gas Co., Pittsburgh, 30 miles, 20-inch, gas, main, Silver Springs to East Elma, N. Y., $1.6 million, temporary FPC authorization.

North Carolina Natural Gas Corp., 630 miles, 2-16 inch, from Transco's system near Mooresville across to southeastern North Carolina, $30 million contracts let to C. N. Flagg & Company, J. P. Neill Co., and Somerville Construction Company.

Northern Illinois Gas Company, 140 miles, 24-inch, gas, main line, East Dubuque to Des Plaines, Ill., planned.

Northern Natural Gas Co., Omaha, 167 miles, 20 inch, gas, from Farmington, Minn. to Duluth, Minn., and Superior, Wis., $12 million, before FPC.

42 miles, 10 inch, gas, from Rochester, Minn. to Winona and Goodview, Minn., $963,000, before FPC.

365 miles, gas, new facilities in Minn., Iowa, S. D., Neb., Wis., plus 1090 miles of branch line and station facilities, $65.7 million, authorization for a part. Gas facilities in Texas, Oklahoma and Kansas, $6 million, before FPC.

454 miles, main line loops and extensions, 6-30-inch, main line from St. Cloud, Minn., to Grand Forks, N. Dak., also 1,490 miles of branch lines, 2-10-inch, and station additions totaling 32,000 horsepower, $86 million, planned.

27.6 miles, 30-inch, gas, loop; 18.3 miles north of Beaver station in Okla., 9.3 miles north of Sunray station in Texas, $3 million, authorized.

Northern Utilities Co., 35 miles, 16 inch, gas, in Fremont Natrona County, Wyo., area; 8 miles, 12 inch, around Casper; 6 miles, 8 inch, from Sand Draw gas field to Beaver Creek field; 12 miles, 6 inch, from Beaver Creek field to the system servicing the Riverton-Lander area, planned.

Ohio Fuel Gas Co., 51 miles, gas, main lines, in Belmont, Carroll, Cuyahoga, Fairfield, Logan, Lorain, Marion, Muskingun, Stark and Wayne counties, Ohio, $2.2 million, authorized.

Natural gas storage field in Medina County, Ohio, 12 miles, 4½ to 20-inch gas, $5 million, authorized.

Pacific Gas & Electric Co., 1300 miles, 30-inch gas, from Alberta, Canada to Antioch, Calif., $380 million, planned.

Pacific Lighting Gas Supply Co., 128-mile, 34-inch, gas, main line from Topock, Ariz. to Newberry, Calif., authorized.

Pacific Northwest Pipeline Corp., Salt Lake City, 235 miles gas, gathering lines in San Juan Basin, Garmesa, Piceance Creek, and Big Piney Fields, $13.5 million, planned.

65 miles, gas, sales laterals in Washington, $1.5 million, planned.

Pennsylvania Gas Co., Warren, Penn., 38 miles, 8 and 10 inch, gas, in Erie and Warren Counties, Penn., and Chautauqua County, N. Y., $2.6 million, authorized.

Permian Basin Pipeline Company, Omaha, 61 miles, 16-inch, lateral, gas, 11 miles, various diameter, field lines, nine meter stations, to take gas from Emperor field, Winkler County, Texas, $3.7 million, FPC control let to R. H. Fulton & Co.

Piedmont Gas Co., Hickory, N. C., 78 miles, 2-8 inch, gas, from connection with Transcontinental Gas Pipe Line to serve customers in North Carolina, $2.6 million, authorized.

Pioneer Natural Gas Co., Amarillo, Texas, 62 miles, 10-inch main, Pampa, Texas, to Canyon, in Randall County, Texas, 20 miles, small diameter, gathering, 4,000 h.p. stations, $4.5 million, planned.

Phillips Petroleum Co., 25 miles, 6 to 20-inch, gas, South Eunice, New Mexico area, planned.

52 miles, 4 to 20-inch, gas, Gaines County, Texas, planned.

44-mile, 6-inch, products line, from Rocky pump stations to Amarillo, Texas, planned.

Service Pipe Line Company, Casper, Wyo., 4,000 compressor hp at Herndon, Kans., 2,000 compressor hp at Scranton, Kans., and 2,000 compressor hp at LaGrange, Wyo.; additional 2,000 hp at Laton station, Rocks County, Kans., 2,200 additional hp at Elk Basin, Kirby, Owl Creek, and Lost Cabin stations, north of Casper, Wyo., planned.

Southern California and Southern Counties Gas Cos., Los Angeles, 200 miles, 34-inch, from Nevada-California border to point near Fullerton, Calif., $44 million, before Public Utilities Commission.

Southern Kansas Pipe Line Co., Inc., Arkansas City, Kansas, 200 miles, 6-10 inch, crude, southwestern Kansas to Arkansas City, Kansas, planned.

Southern Natural Gas Company, Birmingham, 136 miles, 24 and 26 inch; 215 miles, various diameter supply lines; 3,650 additional compressor horsepower to White Castle and Toca Stations; 8 miles, contract let to Conner Construction Co., 20-inch loops; 660 hp Franklinton station, and 23 measuring stations, $40 million, contracts let to William Brothers, Western Pipe Line, Inc., Brown & Root, Inc., and River Construction Corp. on 305 miles.

458 miles, 16-24-inch, loop lines, gas, between Gwinville, Miss., and Wrens, Ga.; 62 miles, 14-inch, loops, along Atlanta-Macon line; 53 miles, 6⅝ to 14-inch, loops, along various branch lines. 3,140 additional hp at Gallion and Elmore, Ala. and Wrens, Ga. 60 miles, 20-inch, loops, in Louisiana between Franklinton and White Castle and South of Toca. Lateral lines south of Gwinville and west to Cranfield field. 8,720 hp added at Franklinton, White Castle, Patterson and Brookhaven. $65 million, contracts let to River Construction Corp., H. C. Price, Latex Construction Co., and Houston Contracting Co. on 355 miles.

Tennessee Gas Transmission Co., Houston, 264 miles loop lines in Tennessee, Kentucky, West Virginia and Pennsylvania, FPC Examiner authorization.

Compressor stations in Mississippi, Tennessee, New York, Pennsylvania and additions in Tennessee, Kentucky, Ohio and Pennsylvania, $129 million, FPC Examiner authorization.

21 miles, 16-inch, 2 miles, 12¾-inch, gas, Louisiana coast, Vermillion, Blocks 46 and 64, $2.9 million, before FPC. 158 miles, 36-inch, looping system in Louisiana and Mississippi, to supply Midwestern additional gas at Portland, Tenn. $61.4 million, before FPC.

Texas Eastern-Penn-Jersey Transmission Corp., Shreveport, La., 65 miles, gas, from Delmont, Penn., to Lambertville, N. J., before FPC.

24,000 compressor hp additions to existing stations, $4.4 million, temporary FPC authorization.

4,000 horsepower to its Delmont, Penn., compressor station, five new compressor stations in Pennsylvania with total capacity of 67,000 hp, $11.2 million, authorized.

Texas Eastern Transmission Corp., Shreveport, La., 267 miles, 14-30 inch, gas, Louisiana, Mississippi, Pennsylvania and New Jersey, $50 million, before FPC.

96.5 miles, 30-inch, gas, between Kosciusko, Miss., and Uniontown, Penn.; 9.4 miles of supply laterals; a 10,250 hp compressor station, and 33,360 hp to existing compressor stations, $24.5 million, authorized.

141,780 additional horsepower in existing stations, a new 2,200 hp compressor station, in Louisiana, Mississippi, Pennsylvania, Ohio, Kentucky and Tennessee, authorized.

10 miles, 8-inch, LPG, Lebanon to Todhunter underground storage in Ohio, 62 miles, 8-inch, Tyler to Carthage, Texas, planned.

Texas Eastern Transmission Corporation and Wilcox Trend Gathering System, Inc., gas, compressor stations, $4 million, authorized.

Texas Gas Gathering Corp., Shreveport, 36.6 miles, gas, gathering system in Rodney Field, Jefferson County, Miss. and from North and South Locust Ridge, Lake St. John Field in Tensas and Concordia parishes, La., $855,413, before FPC.

Texas Gas Transmission Corporation, Owensboro, Ky., 92 miles, 30-inch, 19 miles, 26-inch, and 15 miles, small diameter, loop portions of system in Louisiana, Arkansas, Mississippi, Kentucky, Indiana and Illinois; additional horsepower at Pineville, La., Kenton, Tenn., Calvert City, Ky., Slaughters, Ky., Dillsboro, Ind., and Petersburg, Ind., totaling 9,040 hp. $20 million, contract let on 30 miles to Houston Contracting Co.

Texas Illinois Gas Pipeline Company, Chicago, 16,000 additional hp to stations at Lufkin, and Marshall, Texas; Texarkana, Malvern, Searcy, and Biggers, Ark.; Jackson, Mo.; and Hammond. Ill., $3.9 million, before FPC.

Transcontinental Gas Pipe Line Corp., Houston, 204 miles, 36-inch, 107 miles, 30-inch, main line loops in 10 states; 3 intermediate stations: North Carolina, Virginia, Pennsylvania; 2,500 additional hp at six compressor stations; 164 miles, 24-inch from Leidy storage Penn.; 29 miles, 30-inch, New Jersey; gathering lines, Louisiana, 119 miles; 10 meter stations; additions to West Cameron and High Island area, 35-miles, 16-inch, 26 miles, 10-inch, and three gathering meter stations; 45 miles, 16-inch, purchase laterals and 5 meter stations, Louisiana; 67 miles, 10, 12, 20-inch miscellaneous transmission purchase laterals in Texas and Louisiana, 3 meter stations; 51 miles, 36-inch and 1 mile, 30-inch in New Jersey; 51 miles, 10- and 14-inch and 3 meter stations, southeast Louisiana (mainly offshore), $137.3 million. Contracts let on 710 miles to Bechtel Corp., Charman, Allen, Gay & Taylor, Panama Williams, J. P. Neill, H. C. Price, Brown & Root, Hallmac Construction Co. and Glaser Construction Company.

151 miles, 24-inch, 12 meter stations, southeast Louisiana, $14.5, authorized.

2,500 additional hp at four compressor stations, St. Francisville, La.; Laurel, Miss.; Linden, Ala. and Wadley, Ala., $3 million, authorized.

Wells, pipe lines, measuring equipment, stations at Leidy storage in Pennsylvania, $12.5 million, authorized.

149 miles, 36-inch, main loops, 34 miles, 20, 24-inch gathering, compressor stations at Neuces County, Texas and St. Helena Parish, La., additional hp in eight stations, $51 million, before FPC.

Trans-Utah Pipeline, 120 miles, 16-inch, gas main line from Uinta Basin to Salt Lake City, considered.

Transwestern Pipeline Company, Houston, 1,305 miles, 24- and 30-inch, gas, main line, from West Texas and Oklahoma-Texas Panhandle area to Topock, Ariz., $193 million, before FPC.

Trunkline Gas Company, Houston, 204 miles, 26-inch, gas, main line from Tuscola, Ill., to Michigan-Indiana border; 464 miles, 30-inch loops between Longville, La., and Tuscola and 45 miles, 24-inch, in Texas, 183 miles gathering, Louisiana, 3000 additional hp at Longville station, $81.5 million, before FPC.

Underground Storage & Exploration, Upper Darby, Penn., 394 miles, 12-inch LPG, from Moundsville, W. Va. to Newark, N. J., $9 million, approved.

95 miles, 6-8 inch, laterals to Mauch Chunk, Penn., and to Philadelphia, planned.

United Gas Pipe Line Co., Shreveport, La., 203 miles, 30-inch, gas, between New Orleans and Mobile, Ala., $33.7 million, contracts let on 30-miles to O. R. Burden, 38 miles to Williams Bros., and 12 miles to Western Pipe Line, Inc.

Valley Gas Transmission, Inc., Houston, 160 miles, 3 to 8-inch, gas, gathering, in Hidalgo, Brooks, Starr and Jim Wells Counties, Texas, $15 million, before FPC.

International

ACT Oils, Ltd., Montreal, 400 miles, crude, Dawson Creek, B. C., to Bella Coola, B. C., before B. C. government.

Alaska-Yukon Refiners and Distributors, Ltd., Edmonton, Alta., 150 miles, products, serving Alaska and Yukon territory, $3.5 million, planned.

Alberta Natural Gas Company (Jointly owned by Westcoast Transmission Co. and Alberta & Southern Gas Co. Ltd.) 36-inch, gas, Alberta border to British Columbia-Idaho border, supply gas to

Pacific Gas & Electric Co., $40 million, planned.

Bituminous Oil Pipeline Co., Calgary, 250 miles, crude, from Athabasca tar sand plant in northeastern Alberta to Edmonton, approved.

Burmah Oil Co., Ltd., 850 miles, crude, 20 inch, from Nahorkatiya to Calcutta, India, planned.

Colombian Petroleum Company, 68 miles, 12-inch, crude, Cicuco field to Covenas, planned.

Consolidated Gathering Systems, Ltd., Calgary, 198 miles, crude, Sturgeon field to Edmonton, planned.

Development and Resources Corp., 70 miles, 8 inch, gas, from Agha Jari oil field to Ahwaz, Iran, planned.

Elburz Oil Corp., 1000 miles, crude, from Central Iran to Alexandretta, Turkey, $450 million, planned.

Entre Nazionali Idrocarburi, Rome, Italy, crude, from Qum field in Iran to the Mediterranean Sea, considered.

Foothills Pipe Line, Ltd., 500 miles, 12 to 16-inch, LPG, from Alberta to Pacific Coast, $80 million, considered.

Hydrocarbons Pipeline, Ltd., Winnipeg, Manitoba, 880 miles, 6-8 inch, products, from Edmonton to Winnipeg, $35 million, partial authorization.

Independent Pipe Line Co., 2,019 miles, 34-36-inch, crude, Edmonton to Montreal, 23,000 pump horsepower, $395 million, before Borden Commission.

Interprovincial Pipe Line Company, 350-mile extension from Toronto to Montreal, looping line from Edmonton to Toronto, crude, $240 million, considered.

Mid-Continent Pipe Lines, Ltd., 1500-mile, 30-inch crude, Edmonton to Chicago, planned.

NATO, 211 miles, crude, 6-inch, between Malatya-Cetinkaya-Erzincan, Turkey, $6 million, bids asked.

National Iranian Oil Co., 146 miles, 6 inch, crude, from Azna to Isfahan, Iran, $5 million, planned.

1000 miles, 38 inch, crude, from central Iran to the Turkish Mediterranean coast, considered.

Peace River Oil Pipe Line Co., Ltd., 70-mile, crude, Swan Hills to Iosegun Junction, approved.

Petroleos Mexicanos, 38 miles, 4 inch, products, from Mexico City to Toluca, $500,000 planned.

126 miles, 4, 6 and 8 inch, products, from Mexico City to Cuernavaca and Puebla, $2.5 million, planned.

Pipelines of Puerto Rico, Inc., 95 miles, 8-inch, products, Penuelas to San Juan, Puerto Rico, planned.

Sociedad Nacional de Oleoductor, 75 miles, crude, from Santiago-to-Valparaiso, $3 million, planned.

Sui Gas Transmission Co., Multan, Punjab, India, 145 miles, 8-inch, gas, from Sylhet to Dacca, East Pakistan, $9 million, considered.

130 miles, 16-inch, gas, main line, Multan to Lyallpur, planned.

Trans-Europe Pipe Line, 700 miles, 30 inch, main trunk, crude, from Mediterranean to northern Europe, considered.

Trapsa, 475 miles, 24-inch, crude, from Edjele, Tiguentourine, and Zarzaitine fields in eastern Algeria to Tunisian port of La Skhirra on Gulf of Gabes.

Union Gas Company of Canada Limited, 45 miles, 8-inch, gas, main, Stratford to Goderich, Ontario; 10-miles, 8-inch, main, to Amhertburg; 10-miles, 12-inch, lateral, Galt to Brantford, planned.

Westcoast Transmission Company, Ltd., 174 miles, 30-inch, gas, Savanna Creek gas field, Alberta, to British Columbian border, $45 million, planned.

650 miles, crude, from Peace River area to Vancouver, $100 million, planned.

Williams-McWilliams Industries, Inc., New York, 441 miles, 6-inch, crude, Villa Montes, Bolivia to Villa Hayes, Paraguay, considered.

Yacimientos Petroliferos Fiscales, Buenos Aires, Argentina, 621 miles, 12-inch, products, Mendoza to San Lorenzo, Argentina, $19 million, planned.

281 miles, 12¾ inch, crude, Pichanal to San Miguel Tucuman to Techint, S. A., planned.

450 miles, 16-inch, crude, from Neuquen Province to Bahia Blanca, planned.

1300 miles, gas, from Comodoro Rivadavia Field to Buenos Aires, $200 million, agreement signed with Williams Bros. Co.

Southern Natural Hearing Scheduled for January 20

The Federal Power Commission hearing on Southern Natural Gas Company's proposed $55 million expansion program has been set for January 20.

Southern is seeeking permission to construct and operate 461 miles of 16-24-inch main line loops; 115 miles of various diameter branch lines; 11 miles of field lines and supply laterals; 8,624 additional horsepower and appurtenant facilities. The new facilities would enable Southern to meet 1960-61 requirements with an additional 325 MMcf per day delivery increase. Supply lines would connect four new fields, Bayou Felice, Coffee Bay and Triumph in Louisiana, and Cranfield in Mississippi.

Earlier this year Southern Natural was given permission to connect Bayou Felice and Triumph Fields and build facilities necessary for 1958-59 season.

Included in the application was a budget-type proposal for construction of supply facilities to be added by the end of 1960, costing $3 million.

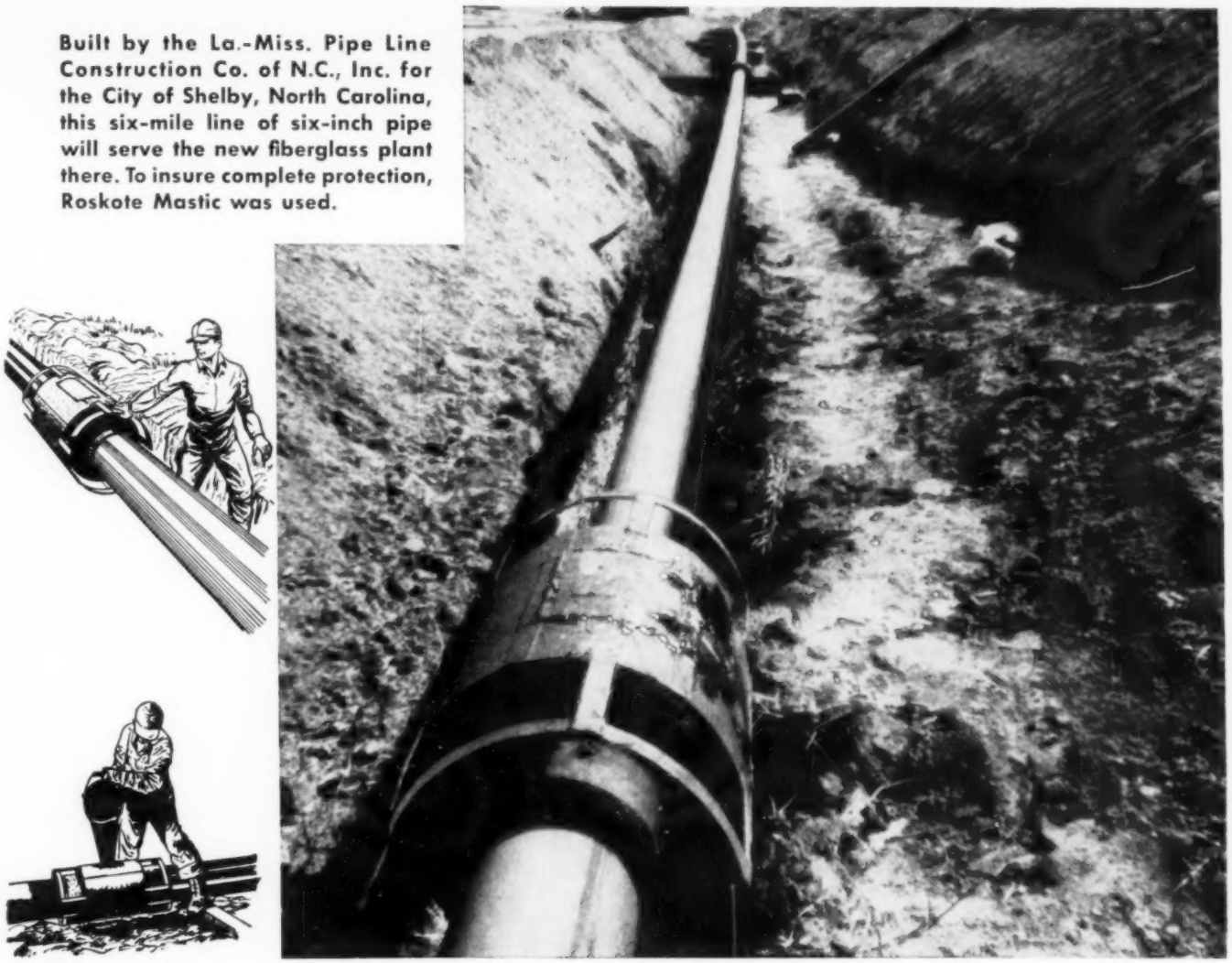
Pentzien, Inc. Receives River Crossing Contract

Gulf Interstate Gas Company has awarded a Red River pipe line crossing job to Pentzien, Inc. Pentzien will fabricate and install a single 20-inch, with 16-inch flexible joint, natural gas pipe line across Red River about 15 miles below Alexandria, La.

TGT's "Most-Traveled" Compressor Units

Tennessee Gas Transmission Company's "most traveled" compressor units have been on the move since 1952 testing TGT gas lines throughout the country. The compressors are shown testing Tennessee's recently completed 24-inch line from Hamburg, N. Y., to Coudersport, Penn. Six cylinder unit on the right raises air to 1,030 psi in three stages; pressure is boosted to 1,276 psi by the single stage unit on left.

Built by the La.-Miss. Pipe Line Construction Co. of N.C., Inc. for the City of Shelby, North Carolina, this six-mile line of six-inch pipe will serve the new fiberglass plant there. To insure complete protection, Roskote Mastic was used.



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Six miles of six-inch pipe . . . a small job? To be sure, but representative of the bulk of pipeline jobs. Whether two miles of two-inch or twelve miles of twelve-inch, Roskote and the manually operated Roskoter provide fast, positive protection at lowest cost.

Two coats were applied on this job, using two Roskoters (shown in position on the line), traveling just "drying time" apart—which for Roskote is only a half hour.

Roskote has high electrical resistivity and extreme resistance to all corrosive environments. It dries to a tack-free film in 30 minutes or less. Unaffected by temperatures from sub-zero to 250°F., Roskote will not oxidize, scale or check. It bonds readily to previous coatings, such as Roskote, coal tar or asphalt. Roskote may be applied also by brush, glove or spray.

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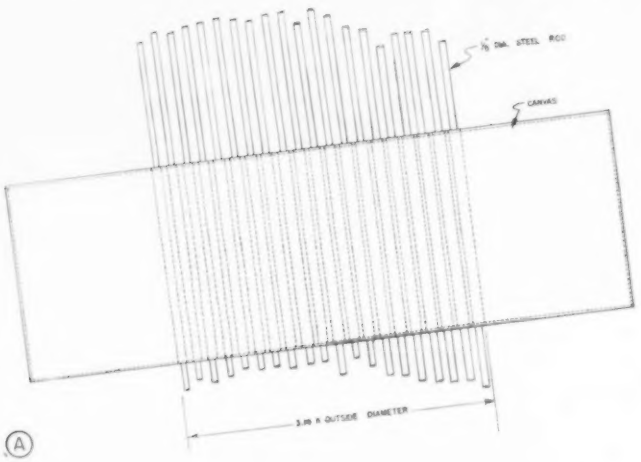
How to do it

PIPE LINE HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas

Fabricate Adjustable Templates to Join Pipe at Angle



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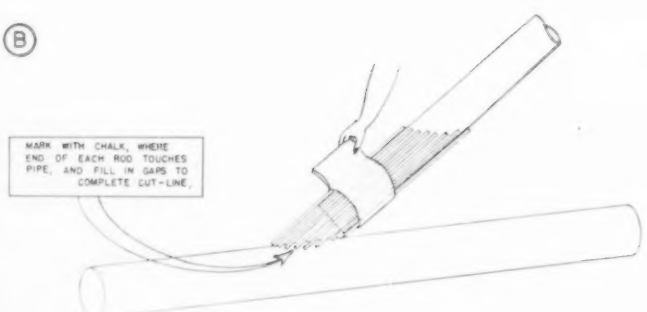

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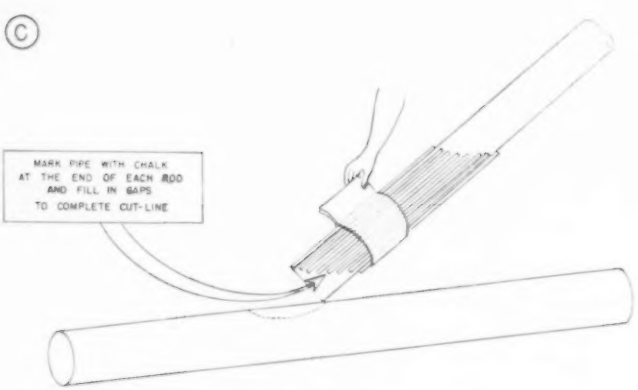


An adjustable wrap-around template defining cut-lines for pipes that must join at a definite angle can be fabricated from two pieces of canvas 4-inches wide and long enough to reach around the outside circumference of the pipe, plus a few inches for over-lap.

The edges of each canvas are stitched (hemmed) to prevent unravelling. One piece is laid on top of the other and held in place with pins. Parallel stitch lines are pencilled on the upper canvas rectangle such that when the stitching is done along these lines, equally spaced sleeves are formed between the two pieces of canvas, for accommodating small diameter rods. When stitching is completed and pins removed, ⅛-inch diameter rods are inserted into the sleeves, Figure A.

For laying out angle cuts, the pipes are first held in place at the definite angle they are to join,—the end of one pipe butting against the side of the other. The canvas and rods are wrapped around the end of the angle pipe, and held tight enough to prevent slipping. The template rods are pushed down until the end of each touches the adjacent pipe. The point where the adjacent pipe is marked with chalk and gaps between the points are filled in to form a continuous cut-line, Figure B.

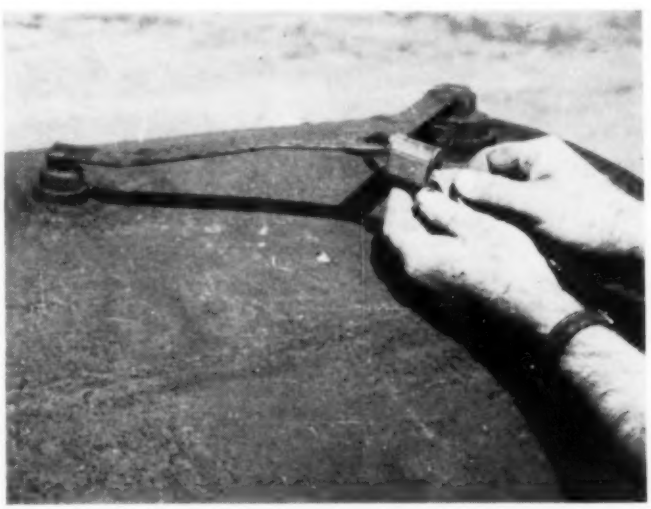
Without moving any of the rods in their sleeves, the circumferential tension on the canvas is loosened and the template is slipped back on the pipe until the marked-ends of all the rods lie on and against the circumferential surface. The point where the end of each rod touches the outer surface of the pipe is marked with chalk and gaps filled in to form a continuous cut-line for the bevel, Figure C.

Such templates work best on pipes that are 3 inches in diameter or larger.

Hydraulic Motor Powers Mobile Welding Machine

The gasoline engine of this "walk-wagon" performs double duty as a direct drive for a welding generator and a hydraulic pump which furnishes fluid power to a hydraulic motor propelling the rig at a speed of 5-8 mph. The unit is "led" by the forward handle which serves as both a steering tiller connected to the single front wheel and as a control for the hydraulic drive. When the handle ring is released by the operator, intentionally or otherwise, it turns to a stopping position, shutting off power and applying brakes. Turning it counter-clockwise releases brakes and starts forward motion. Drive is through rear axle to the wheels.

The compact unit can be maneuvered into tight construction areas which a towing truck could not negotiate. Spiral wire hooks on the pipe boom accommodate welding cable when in operation.



Levers Welded to Plugs Serve as Locking Device

When fuel tanks are located outside the station yard, a simple means of locking the plugs is shown. Levers are welded to them so that they also can be used as wrenches to open the plugs.

Plugs are first screwed in tight and marked in order that the levers can be made the right length to make it easy to put matching holes for the locks. The levers and plugs are then removed and levers brazed to the plugs and holes burned into the ends at the proper places for the locks.

The above view shows 2 plugs being locked simultaneously with one lock; on another job, the plug was locked to the breather pipe which at the same time is locked so that it cannot be unscrewed.

Truck Axle and Differential Speed Work of Unloading Pipe

Where pipe is being unloaded from railroad cars, the use of a truck axle will speed raising and lowering of the pipe. The combination of hydraulic brakes and spider gears in the differential does the trick. The power take off is connected to the drive shaft in front of the differential and the two control levers are connected to each of the hydraulic brakes.

To raise the pipe, the drum shown on the right is wound up by tightening the brake on the left and making the spider gears deliver power to the drum. After the load is raised, the brake on the right is tightened and the other one released lowering load on the right brake. The operator soon gets accustomed to raising the load with the lever in his right hand and lowering it with the lever in his left hand. If it is necessary to run off slack, both brakes are loosened.

Fuel Problems of Rigs Solved with Butane Tanks

One construction company solved its fuel problem for rigs working in remote areas by attaching two tanks, holding 190 gallons of butane, to the rear of the crane.

The butane tanks provided enough fuel to keep the rig operating 10 working days. A special carburetor was the only equipment needed to allow for conversion from gasoline to butane.

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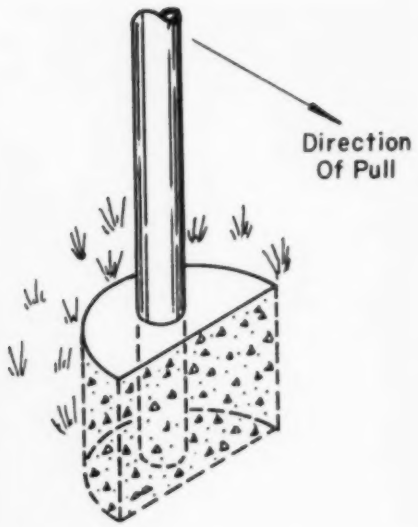
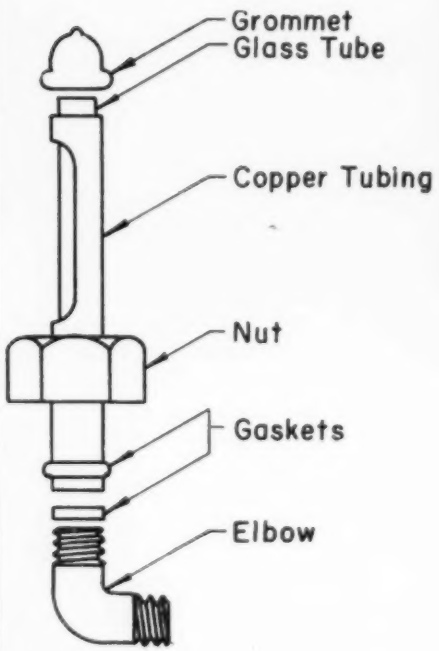


Half Moon Foundation Gives Greater Resistance

Greater resistance to a pull on a fence post or guy pole will be gained by digging the foundation hole half-moon shaped, with flat side perpendicular to the "pull."



Make Oil Sight Gage From Copper, Glass Tubing

Here is an easy way to make an oil sight gage to enable personnel to check the oil in self-lubricating equipment and vehicles at any time. The gage requires a 4-inch piece of ⅝-inch copper tubing, a 4-inch by ½-inch glass tube, a ⅝-inch brass elbow with a ½-inch pipe thread on one end, a ⅝-inch copper nut, 2 rubber gaskets

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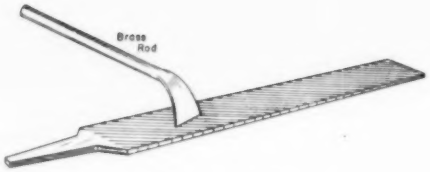
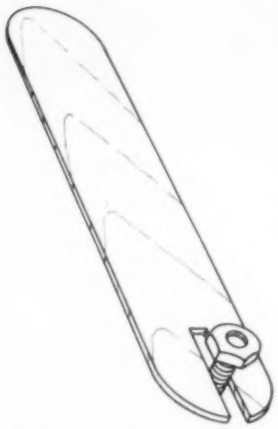
and one rubber grommet to fit 5/8-inch tubing.

Cut the copper tubing as shown in the sketch; heat the glass tube at one end and seal it. Then insert glass tube in copper tubing. Insert the assembly in the elbow on top of one gasket, then place the other gasket inside the nut and screw the tubing in place. Cover top of the glass tube with the rubber grommet and set elbow into the bottom of the lubricant tank. This gage also can be used on dehydration units and other such type equipment.



Tool Made From Brass Rod Used as File Cleaner

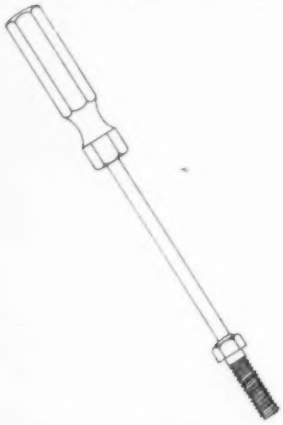
Chips that cannot be removed with a file card can be dislodged with this tool—made by flattening the end of a brass rod, then bending to a curve. Soft brass will not dull file.



Wooden Depressor Serves As Ignition Points Tool

A useful tool that will save time when replacing screw-type ignition points can be made from a wooden tongue depressor. Cut out a small slot from one end of the tool, making sure the hole is small enough so the screw point can be turned in tightly with your fingers.

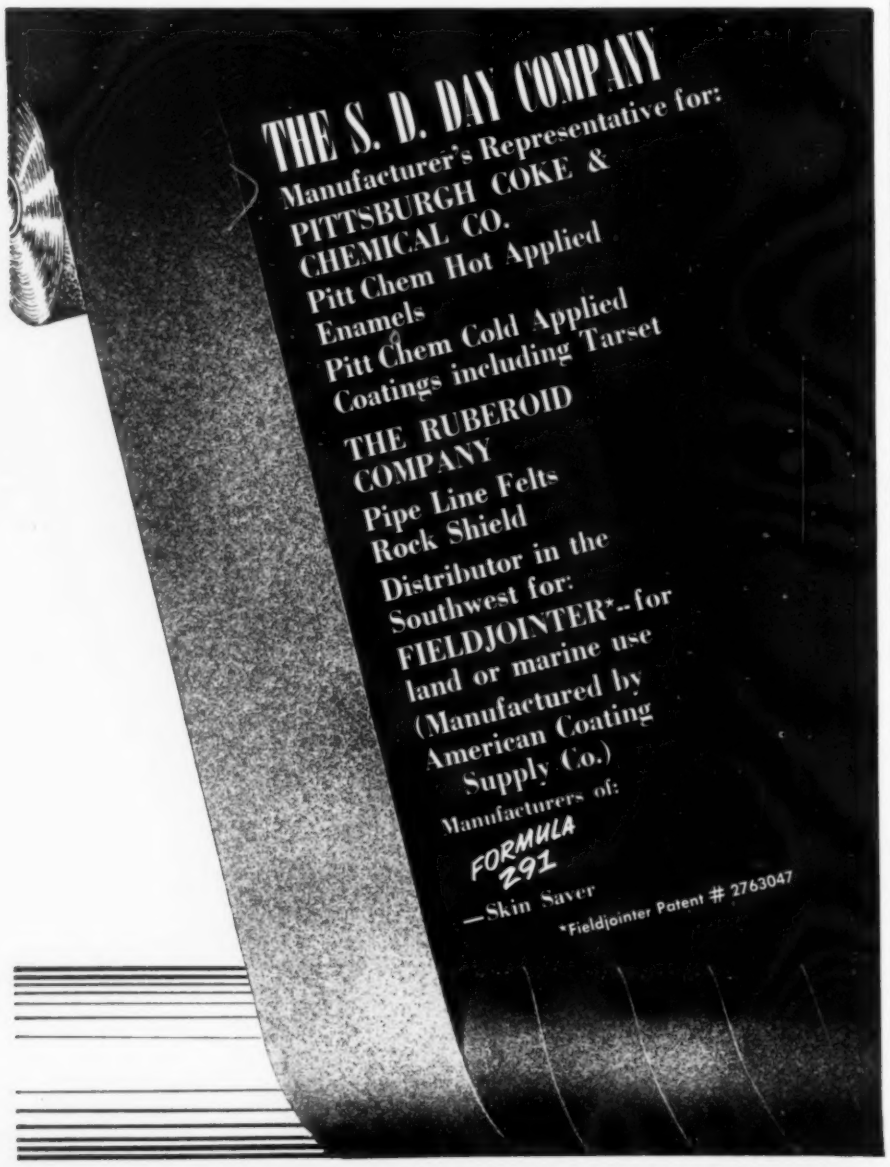
To use it, hold the screw in position with this tool then start the threads with a point wrench. After the threads are started, pull depressor away and screw point in tight.



Oil Pan Tool Expidites Work on Station Engines

The removal and replacement of oil pan or explosion doors on field pumping units or compressor station engines can be simplified with the use of the tool shown above. Using one of these tools at each side or end of the door or pan will save time while inserting or tightening other bolts. It is also a safety measure.

The tool is fabricated from an old screwdriver. Saw the end off the screwdriver and weld bolts like those which are to be used on the door or pan onto the sawed-off end of the screwdriver. A chamfer can be ground on the ends of the bolts for easier starting.



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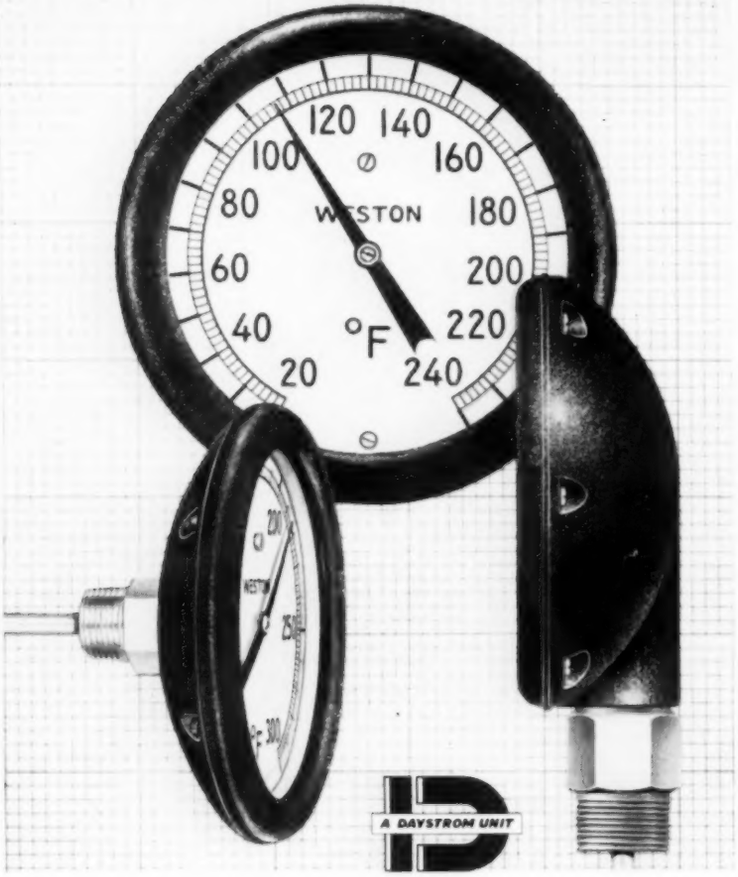

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What's Happening

among MEN in the INDUSTRY

Officers of Right of Way Association's Gulf States Chapter

The American Right of Way Association's Gulf States Chapter elected officers for 1959 at its annual election meeting in Houston December 5. New officers, from left to right, are: W. B. Thornton, Houston Lighting and Power Company; Frank A. Stamper, Houston Title Guaranty Company; Charles B. Runnels, Tennessee Gas Transmission Company; J. M. DeBardeleben, Bureau of Public Roads, Ft. Worth; Kenneth E. Moreland, El Paso Natural Gas Company and Max J. Derbes, Jr., appraiser and realtor, New Orleans.

A. F. Lorton, Jr., has been selected director of public relations activity for the south and west for Gulf Oil Corporation. He succeeds Don Riddle, who retired.

Lorton had been head of public relations for Pacific Northwest Pipeline Corporation until recently. Since September, 1958, he had been associated with James A. Clark, oil and gas writer, in consulting work.

Lorton served 11 years as a special agent of the Federal Bureau of Investigation in various assignments including FBI headquarters at Washington, D. C., New York City, Savannah, Ga., Birmingham, Ala., and Houston. He resigned from the FBI in 1950 after serving in Houston three and one-half years. Headquarters with Gulf will be in Houston.

A. F. Lorton, Jr.

Jerome W. Komes has been elected senior vice president of **Bechtel Corporation** and to executive vice presidency and other appropriate positions in the company's international subsidiaries and affiliates. He will have senior operational responsibilities for the extensive overseas activities of the Bechtel engineering and construction organization.

Komes will take on many of the duties formerly performed by the late **George S. Colley, Jr.** A veteran in construction field with 18 years at Bechtel, Kome became vice president in 1951 and was elected to the board of directors in 1955.

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The MYOCO asphalt kettle is available in 10, 27, 30 barrel sizes, powered by a Wisconsin engine or its electric equivalent, and with Athey tracks, steel skids, or fitted for stationary use. Blower or mailbox type burners are optional.

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"President Washington, who spoke of usurpation, said in his Farewell Address: 'If in the opinion of the people, the distribution of the Constitutional powers be in any particular wrong, let it be corrected by an amendment . . . but let there be no change by usurpation; for . . . this is the customary weapon by which free governments are destroyed' "

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James W. Kerr

Charles S. Coates

James W. Kerr has been elected president and chief executive officer of **Trans-Canada Pipe Lines Limited.** Kerr succeeds **Charles S. Coates,** Trans-Canada's president since 1957, who was elected chairman of the board to fill the vacancy created by the resignation of **N. E. Tanner. Tanner** will remain as a director.

Kerr, previously was vice president and general manager of the Canadian Westinghouse Company's apparatus products group. Coates, who joined the company in 1954, as executive vice president and general manager, directed the design, engineering and construction of the 2,290-mile Alberta-Quebec gas line. He was named president in 1957.

Tanner has been affiliated with Trans-Canada since 1954 when he became president. In 1957 he was elected chairman of the board. He will continue to take an active part in the operation of the pipe Line company and will maintain his office in Calgary.

Officers of the **Pipe Liners Club** have been announced for 1959.

J. M. Lineham, Mid-Continent Pipe Line Company has been elected president. **Harry Moreland,** Great Lakes Pipe Line Company, has been named vice president and **Oliver C. Klinger Jr.,** Pipe Line News, becomes secretary-treasurer.

Sun Oil Company announces the appointment of **Robert L. Sullivan** as division gas superintendent for Southwest Production division. **John E. Walke** and **Aubrey V. Hamilton, Jr.** have been named assistant division gas superintendents.

R. L. Sullivan

Sullivan, assistant division gas superintendent since 1956, succeeds **Gerald B. Bennett.** Walke, formerly division gas engineer, will be responsible for plants and operations. Hamilton, on special assignments since 1957, will handle contracts and sales for the division. Sullivan has been with the company since 1946 and was elevated to assistant division superintendent in 1956. Walke joined Sun in 1945. He became chief gas engineer in 1949 and was promoted to division gas engineer in 1954. Hamilton started with Sun in 1946 and became senior gas engineer in 1954.

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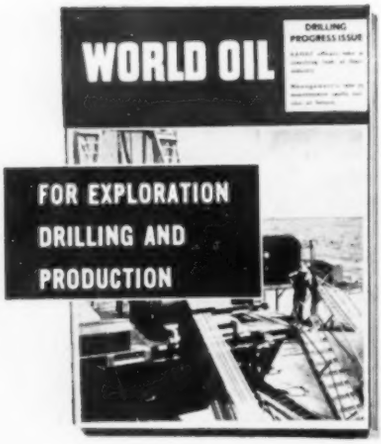
HOW GULF PUBLISHING COMPANY SERVES

Specialized Monthly Petroleum Publications—Over a period of 43 years, Gulf Publishing Company's name has become a symbol for specialized petroleum industry publications. Those pictured on this page are issued for each of the three specialized oil industry operating divisions—Drilling-Production, Pipe Line and Refining.



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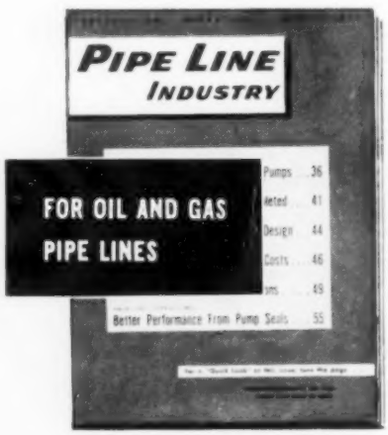

PIPE LINE INDUSTRY is designed and edited to serve the specialized pipe line division of the industry. Expanding a new concept in editorial service, this publication each month offers coverage of construction, operations and maintenance.

Job-help articles by industry experts stress new developments, efficient use of equipment, latest engineering-operating features.

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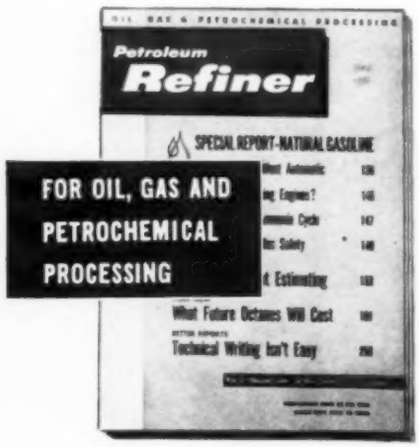

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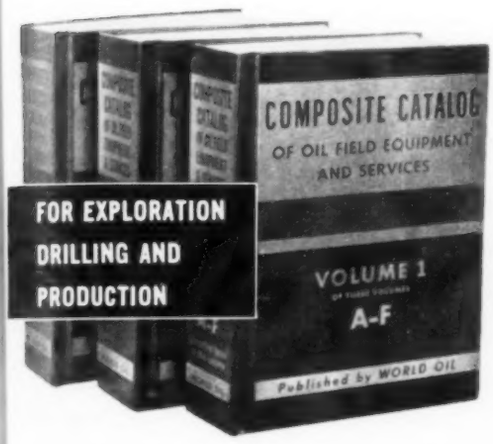
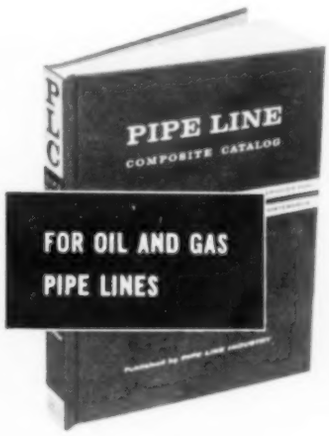
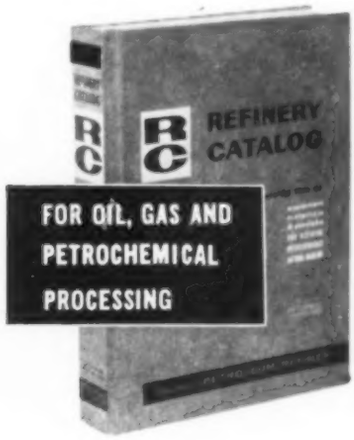
THE SPECIALIZED OIL INDUSTRIES . . .

Specialized Petroleum Industry Catalogs—If you buy for or sell to the Petroleum Industry markets, you need adequate catalog data. Here are Gulf Publishing Company's three specialized oil industry pre-filed catalogs. Like the publications pictured on the opposite page, the catalogs are symbolic of the service Gulf Publishing has provided this industry for 43 years.







For 30 years COMPOSITE CATALOG OF OIL FIELD EQUIPMENT AND SERVICES has been serving the Drilling-Production Division of the Industry.

Used all over the world, this current catalog has 5,384 pages from more than 500 different companies selling to this industry. It is indexed and cross-indexed for easy reference.

Published every 18 months, it has detailed data on every type of Drilling and Production Equipment. It is the largest and most complete composite catalog ever published for this industry (or many others).

Gulf Publishing Company in 1957 began the publication of a new, specialized PIPE LINE COMPOSITE CATALOG. This catalog goes to men having actual buying and specifying authority in pipe line companies, gas transmission companies, pipe line contractors and engineering-design concerns. It is published every 18 months.

The PIPE LINE COMPOSITE CATALOG has 540 pages of complete or condensed catalog information from 169 leading suppliers to this division of the industry. It is serving as a genuine time saver for pipe line men with buying and specifying authority.

The REFINERY CATALOG contains the complete or condensed catalogs of almost 300 manufacturers and service companies selling to the Refining Division of the Industry. This information is contained in a 1,000-page annual volume.

For 26 years, REFINERY CATALOG has been the preferred source of buying information for Oil, Gas and Petrochemical Processing men with purchasing authority. It makes equipment and services easier to buy, easier to sell.

Completely indexed by products and services, the REFINERY CATALOG is a useful on-the-job tool.

Gulf Publishing Company composite catalog files perform a specialized service for each division of the Petroleum Industry they serve. They perform an unduplicated service to the oil men, are used right on the job.

GULF PUBLISHING COMPANY

WORLD'S LARGEST SPECIALIZED OIL INDUSTRY PUBLISHERS

OFFICES: Houston, New York, Chicago, Cleveland, Dallas, Tulsa, Los Angeles, London, Hannover.

Sinclair Pipe Line Company announces the formation of a new executive department, and reorganization and consolidation of the company's crude and products pipe line systems.

J. D. McConnell, vice president and director of crude lines, becomes vice president and director of Economics and Planning department. **J. A. Jackman,** executive assistant will assist McConnell in the new department. **Lewis B. Moon,** vice president in charge of products lines, will have charge of crude oil and refined products pipe line networks.

Ray O. Shaffer, president and board chairman of Welex, Inc., has been elected a director of **Continental Oil Company.** He succeeds **Arthur W. Page,** who resigned after serving nearly 20 years on Continental's board.

Shaffer became president of Welex, Inc., in 1950. He is also president of Welex of Venezuela and Welex of Canada. Earlier this year he was elected board chairman of the Reed Roller Bit Company, Houston.

Interstate Oil Pipe Line Company announces the appointment of **F. Roy Ball** to manager of the Material-Traffic department. He succeeds **H. P. Hellinghausen,** who retired.

Robert B. Giezentanner has been made assistant manager of the Material-Traffic department replacing Ball.

W. C. McGee, Jr.

Harold Burrows

Tennessee Gas Transmission Company announces the realignment of the administration and control of its pipe line system, and formation of three new companies. **Harold Burrows** has been elected executive vice president of the company.

The three new divisions include Tennessee Gas Pipeline Company, to operate transmission system; Tennessee Gas and Oil Company, to operate exploration and production, and Bay Petroleum Company, to conduct business of Tennessee Gas and subsidiaries related to the manufacture and marketing of petroleum products.

Personnel promotions are **W. C. McGee, Jr.,** president of Tennessee Gas Pipeline Company; **R. C. Graham,** president of Tennessee Gas and Oil Company; **R. R. Dean,** president of Bay Petroleum Company.

T. B. Hickman

S. O. Tostengard

Gulf Refining Company announces three promotions in crude oil operations and transportation departments.

T. B. Hickman has been elected vice president and manager of operations, succeeding **Walter Shannon** who recently was named Gulf's director of pipe line engineering. **S. O. Tostengard** has been named coordinator of pipe lines of Gulf Refining and **Fred McIntosh** replaces Hickman as manager of oil movements.

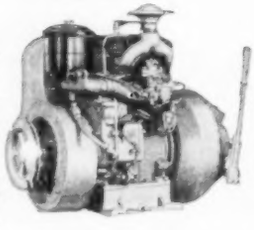
Fred McIntosh

Hickman's pipe line career began with Humble Pipe Line Company in 1924. Two years later he joined Gulf and became assistant chief dispatcher in 1942. In 1952 he was named superintendent of oil movements. Tostengard has been with Gulf since 1949. He started in the Comptroller's department. In 1951 he became assistant to the general manager of the pipe line department and in 1957 was elected a director of the company and appointed cost and economics supervisor. Later he was made part interest executive, he remained at this position until his recent promotion.

How YOU can benefit from—

50 YEARS OF WISCONSIN ENGINE PROGRESS 1909-1959

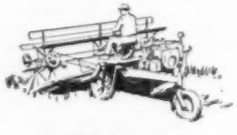
This year of 1959 is the Golden Anniversary of Wisconsin Engines. It heralds 50 years of continuous engine progress. Fifty years of engineering development and exclusive specialization in the design and manufacture of engines.



• Originally manufactured in a power range up to 200 hp., Wisconsin Engines helped to make automotive history as well as supplying dependable power for many industrial applications—service that called for the most advanced engineering.

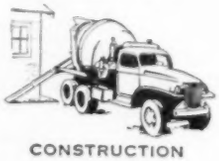
• Heavy-duty design and construction and High Torque performance have been traditional features of *all* Wisconsin Engines. You get longer life from Wisconsin Engines and lowest cost maintenance.

• Today the Wisconsin line comprises the most complete line of Heavy-Duty Air-Cooled Engines in the industry. They are supplied in 4-cycle single cylinder, 2-cylinder and V-type 4-cylinder models in a complete power range from 3 to 56 hp. There is a Wisconsin Engine of the right size and type to fit the job and the machine.



AGRICULTURE

• Every Wisconsin Air-Cooled Engine is designed for heavy-duty service under all climatic conditions from low sub-zero to 140° F. You get the *Most Engine* for your money for MOST HP. HOURS of service.



CONSTRUCTION

• For 1959 Wisconsin has available a complete line of factory-built LPG Engines (including conversion kits for field installation on Wisconsin gasoline engines). In addition, we offer a new line of heavy-duty, quality-built Vertical Shaft Engines, from 3 to 7 hp.

RAILWAY

• More than 2000 convenient Wisconsin Authorized Service Stations stand ready to provide expert servicing and factory-built parts for all Wisconsin Engines.

Constructive experience is a priceless asset. The benefits to the manufacturer, distributor and user of power equipment are many. You are best served in all respects when you specify "WISCONSIN ENGINES"... *for better service, low-cost maintenance, trouble-free operation and long engine life.* Write for engine bulletin S-237.

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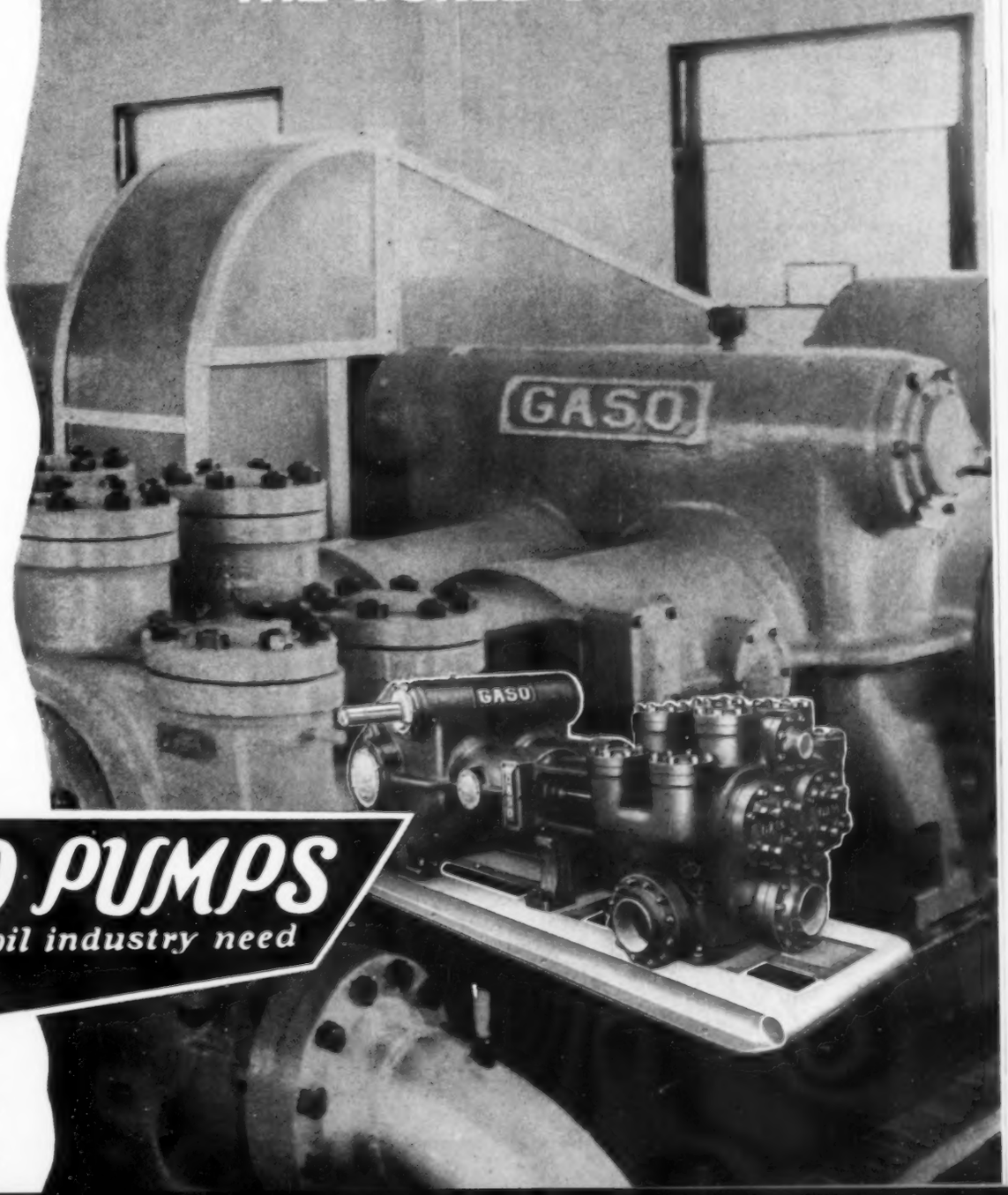

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WHO'S MEETING WHERE

January

NACE, Canadian Eastern Regional meeting, Montreal, Quebec, January 12-14.

Pipe Line Contractors Association, annual convention, Americana Hotel, Bal Harbour, Fla., January 12-15.

Society of Automotive Engineers, annual meeting and engineering display, Sheraton-Cadillac and Statler hotels, Detroit, January 12-16.

NACE, Houston Section, annual short course in fundamentals of corrosion control, University of Houston, January 22-23.

Texas Society of Professional Engineers, annual convention, Shamrock Hilton Hotel, Houston, January 22-24.

Annual Midwest Welding conference, sponsored by Armour Research Foundation of Illinois Institute of Technology, and American Welding Society, Chicago section, Illinois Institute of Technology, Chicago, January 28-29.

Oklahoma Society of Professional Engineers, annual meeting, Mayo Hotel, Tulsa, January 30-31.

February

American Society for Testing Materials, D-2 committee on petroleum products and lubricants, Sheraton-Jefferson Hotel, St. Louis, February 1-6.

Southwestern Legal Foundation, 10th annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas, February 11-13.

NACE, Corrosion Short Course, Mayo Hotel, Tulsa, February 11-13.

NACE, Canadian Western Regional meeting, Calgary, Alberta, Feb. 12-13.

American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Sir Francis Drake Hotel, San Francisco, February 15-19.

Pipe Line Contractors Association of Canada, fifth annual convention, Castle Harbour, Bermuda, February 26-28.

ASTM, Southwest District, annual meeting, Engineering & Scientific Society, Houston, February 26.

Natural Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Texas, February 27.

March

ASME, gas turbine power conference & exhibit, Netherlands-Hilton Hotel, St. Louis, March 1-5.

ASME, gas turbine power conference and exhibit, Netherlands-Hilton Hotel, Cincinnati, March 8-12.

Midwest Gas Association, annual meeting, Hotel Fort Des Moines, Des Moines, Iowa, March 9-11.

NACE, 15th annual conference, Sherman Hotel, Chicago, March 16-20.

New England Gas Association, annual meeting, Hotel Statler, Boston, March 19-20.

ASME, instruments and regulators conference, Case Institute of Technology, Cleveland, March 29-April 1.

April

Instrument Society of America, second national symposium on chemical and petroleum instrumentation, St. Louis, April 6-7.

AGA Operating Section Distribution conference, Netherland-Hilton Hotel, Cincinnati, April 6-9.

American Welding Society, 40th annual convention, Sherman Hotel, Chicago, April 6-10.

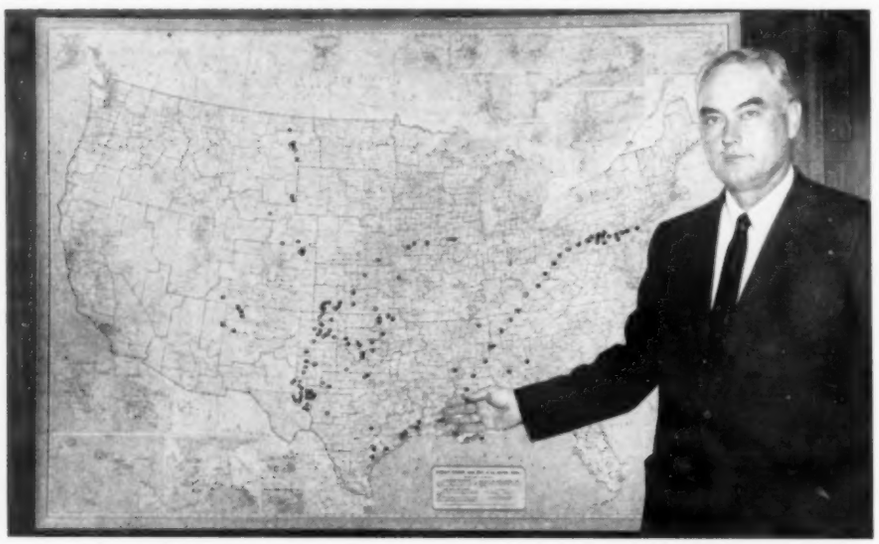
ASME, hydraulics conference, University of Michigan, Ann Arbor, Mich., April 13-15.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla., April 14-16.

ASME, oil and gas power conference, and exhibit, Shamrock-Hilton Hotel, Houston, April 19-23.

Natural Gasoline Association of America, 38th annual conference, Baker and Adolphus Hotels, Dallas, April 22-24.

ASME, metals engineering conference, Sheraton-Ten Eyck Hotel, Albany, N. Y., April 29-May 3.



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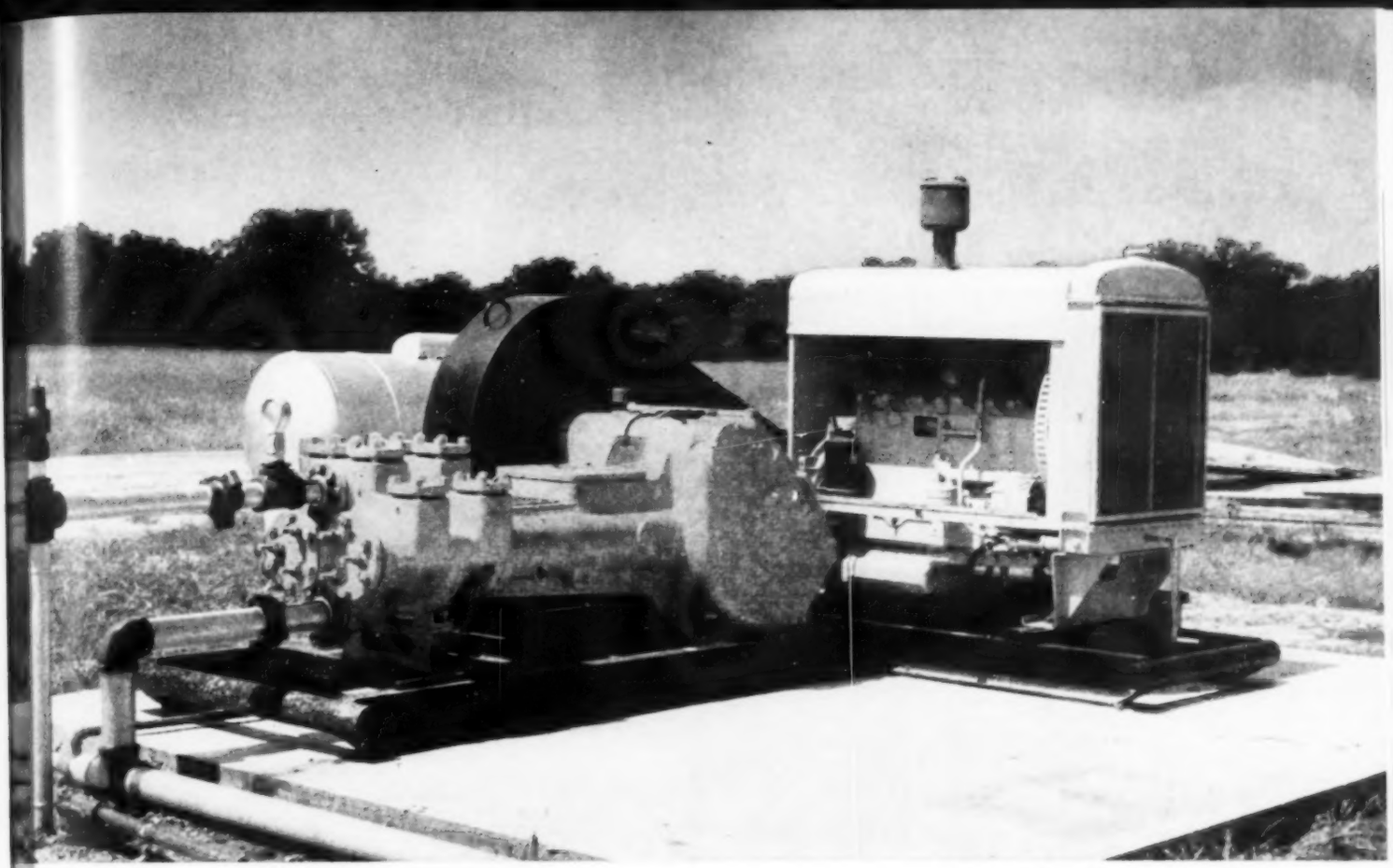

U-510 on salt-water disposal near Sulphur Bluff, Texas.

So *many* uses for

BETHLEHEM DUPLEX GENERAL-SERVICE PUMPS

Bethlehem's U-series pumps are unusually rugged duplex units with a very wide range of general-service application.

No matter which model satisfies your requirements, you will get a pump designed for heavy service. All power ends are built to withstand continuous operation at full load. Positive lubrication is achieved by a fool-proof gravity-flow system. Fluid ends of alloy iron, steel, or aluminum-bronze are available with proper trim to insure maximum durability.

Ask our nearest office or store for complete details.

Major applications of Bethlehem Duplex Pumps:

- Crude-oil gathering
- Salt-water disposal
- Secondary recovery
- Pumping natural gasoline
- Pumping refined products
- Handling LPG
- Lean-oil service
- Mud-mixing
- Rig water supply

A size for every job:

Model	Type	Piston Rod Load, lb	Input hp	Bore and Stroke, in.
U-33	Duplex	2400	11 @ 140 rpm	1 ¾ to 3 x 3
UA-46	"	5000	40 @ 120 "	2 ½ to 4 x 6
U-510	"	12000	100 @ 75 "	3 to 5 ½ x 10

Also available — Bethlehem triplex models:

Model	Type	Plunger Load, lb	Input hp	Bore and Stroke, in.
TP-3	Triplex	3580	22 @ 250 rpm*	1 ¼ to 2 ¼ x 3
TP-4	"	5500	46 @ 250 " *	2 to 4 x 4
TP-6	"	10000	100 @ 200 " *	2 to 4 ½ x 6

*For higher ratings, refer to General Offices, Tulsa, Okla.

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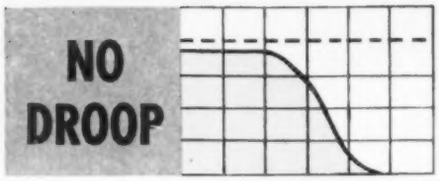

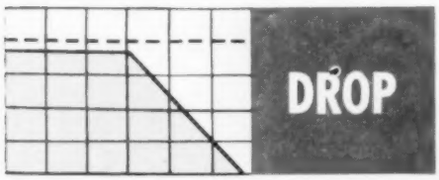

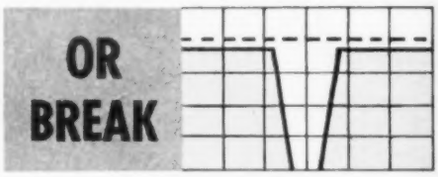

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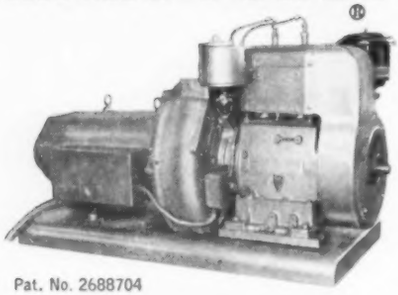

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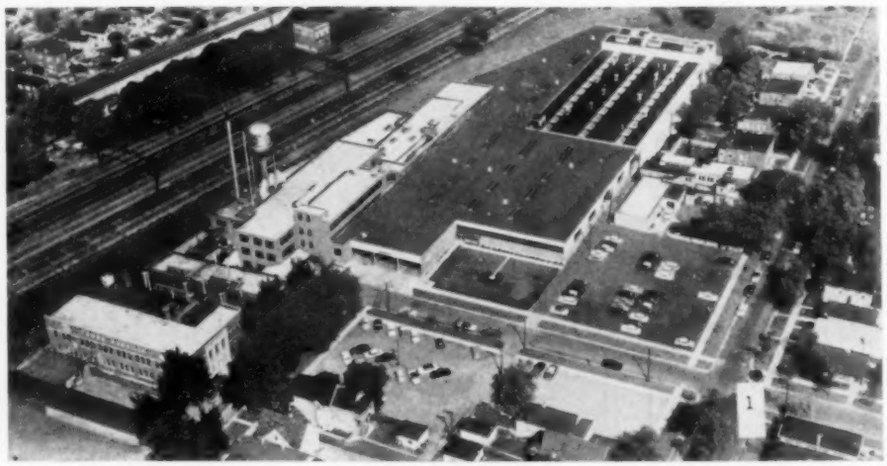
What's Happening among SERVICE and SUPPLY MEN



Johns-Manville Opens Dutch Brand Plant

Johns-Manville Dutch Brand Division recently opened its new plant in Chicago. The modern building, shown in an aerial view, increases production capacity by more than 50 percent and is the seventh of eight new Johns-Manville plants being brought into operation during the company's 100th anniversary year in 1958. Products manufactured at the new plant include pressure-sensitive tapes, adhesives, sponge and custom molded rubber specialties, packings, sealings and gaskets.

PIPELINES
are in the NEWS

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The only automatic self-sealing conduit gate valve. Manufactured in sizes (both full bore and venturi) from 8″ to 36″ inclusive, Classes 300, 400, 600 and 900. Our technical experts are at your service on any questions of application.

The small sizes of Newman-McEvoy Valves have proved their merit under the severest conditions. Now these larger sizes, employing the same time-tested, self-sealing principle, are being made after a most rigid series of tests covering all possible conditions of pipeline service.

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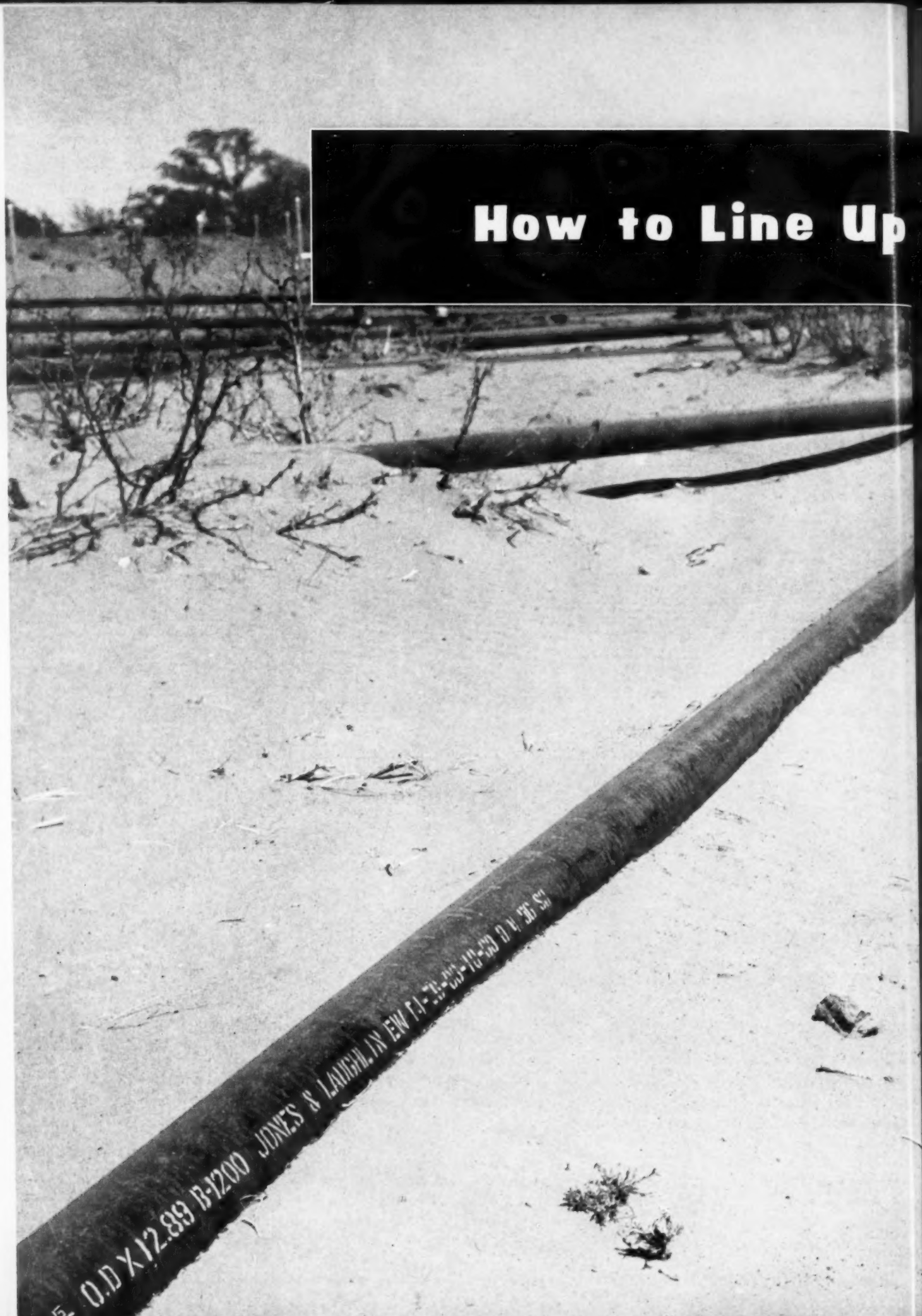
How to Line Up P



p Profits in Gathering Systems

J&L Electricweld Line Pipe is economical to install and reduces maintenance costs during operation.

Because it welds easily, bends safely to any reasonable radius, **J&L Electricweld** can be laid quickly, reducing installation costs.

J&L's quality control program, extending from ore mine through the steel mills, is your assurance of uniform high quality. Longer service life reduces your maintenance costs.

During installation and during operation . . . when you want the best performance . . . you want **J&L Electricweld Line Pipe.**

Available in API 5L and 5LX grades and in a range of sizes from 6⅝" to 12¾" O.D.

Call your local J&L Supply man today to let him help you line up profits in your gathering systems.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

If it's sold by J&L . . . .
It's the best available

ACF Elects Henry Correa Vice President of Marketing

Election of Henry A. Correa as vice president of marketing for ACF Industries, Incorporated has been announced.

Correa, formerly vice president of ACF foreign operations, will continue to supervise that activity. He also will work with the company's six operating divisions in inter-divisional marketing activities in both government and civilian-industrial areas. Before joining ACF in January 1958, Correa was sales manager for the International Division of Bendix Aviation Corp., with which he was associated since 1945. Previously he had been affiliated with Atlantic Aviation, Inc.

Russell N. Keppel Joins Prufcoat Laboratories, Inc.

Russell N. Keppel, formerly director and vice president in charge of marketing for Esso Standard Oil Company, has joined Prufcoat Laboratories, Inc., as vice president.

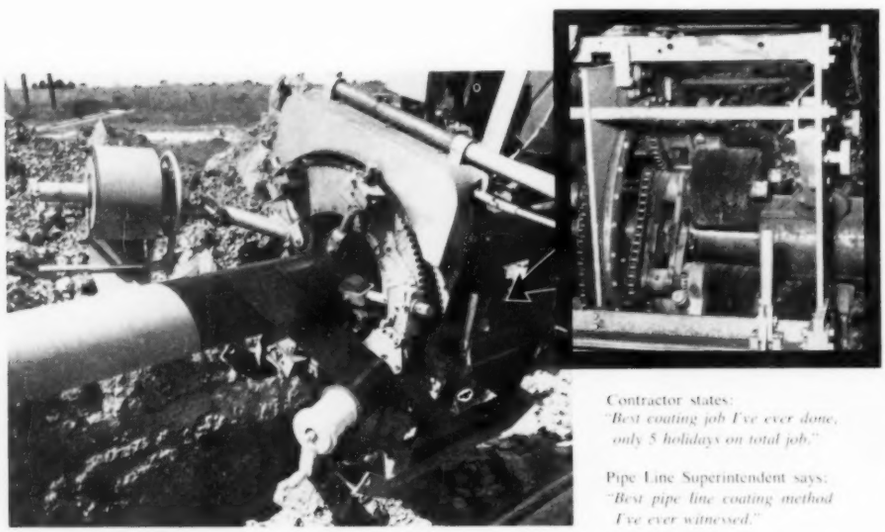
Keppel, who will make his headquarters at Prufcoat's New York office, has broad experience in both domestic and overseas marketing. At Esso he had been responsible, at one time, for the company's 18-state marketing operation and he also had general supervision of all phases of marketing for Standard-Vacuum Oil Company. He began his petroleum industry career in 1920 with the employe relations department at Esso's Bayonne Refinery. He has played an important role in marketing, cost reductions, and sales promotion.

Wrenshall Named General Manager By Kerotest Manufacturing Company

Kerotest Manufacturing has named Edward N. Wrenshall to the newly appointed office of general manager. In his new position Wrenshall will direct and co-ordinate all activities of both steel and brass divisions of the valve manufacturing company.

Wrenshall

Wrenshall served 10 years as director of purchases at Miller Printing Machinery Company; one year as director of purchases at Kerotest and two years as general superintendent of Tube City Iron and Metal Company.



Contractor states: *"Best coating job I've ever done, only 5 holidays on total job."*

Pipe Line Superintendent says: *"Best pipe line coating method I've ever witnessed."*

POLYKEN *Performs . . .*

On Multiple Line Laying

An outstanding example on a multiple line laying job . . . consisting of two 6-inch and one 3-inch lines in *one* ditch . . . was recently completed in the Gulf Coast area. This entire multiple line laying operation was accomplished in gumbo soil.

POLYKEN . . . proven polyethylene tape was used on the entire project. The outerwrap that was used in this operation was Cathodic Protection Service's Delux No. 2.

A single taping machine . . . a Tapemaster, a power driven, cleaning and taping machine . . . simultaneously cleaned, taped and outerwrapped all pipe, of both dimensions, before the lines were laid in the ditch. For further information regarding detailed applications, please call or write the CPS office nearest you.

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Cable Address — CATPROSERV

Corrosion Rectifying Company Promotes William R. Penland

Corrosion Rectifying Company announces the appointment of William R. Penland as assistant southeastern division manager.

Penland, who has been with "Coreco" since early 1957, was formerly associated with both Service Pipe Line Company and Sohio Pipe Line Company as a corrosion engineer. He is a registered professional engineer in Texas and Louisiana.

Fabian Selected President Of Dresser Manufacturing Division

F. G. Fabian, Jr., has been elected president of Dresser Manufacturing Division. Fabian has been with Dresser since 1953. Prior to joining the company he had been with Booz, Allen and Hamilton, management consultants in Chicago for three years.

Fabian was made assistant to the general manager and in 1955 he became general manager.

B. R. Jones & Co. Appoints W. L. Gruneinsen Sales Engineer

W. L. Gruneisen becomes a sales engineer with B. R. Jones & Company, Fisher Governor Company sales representative in southern California.

For 8 years Gruneisen was associated with the Instrument and Standards department at Anderson, Clayton & Co., and was project engineer for 2 years with C F Braun Company.

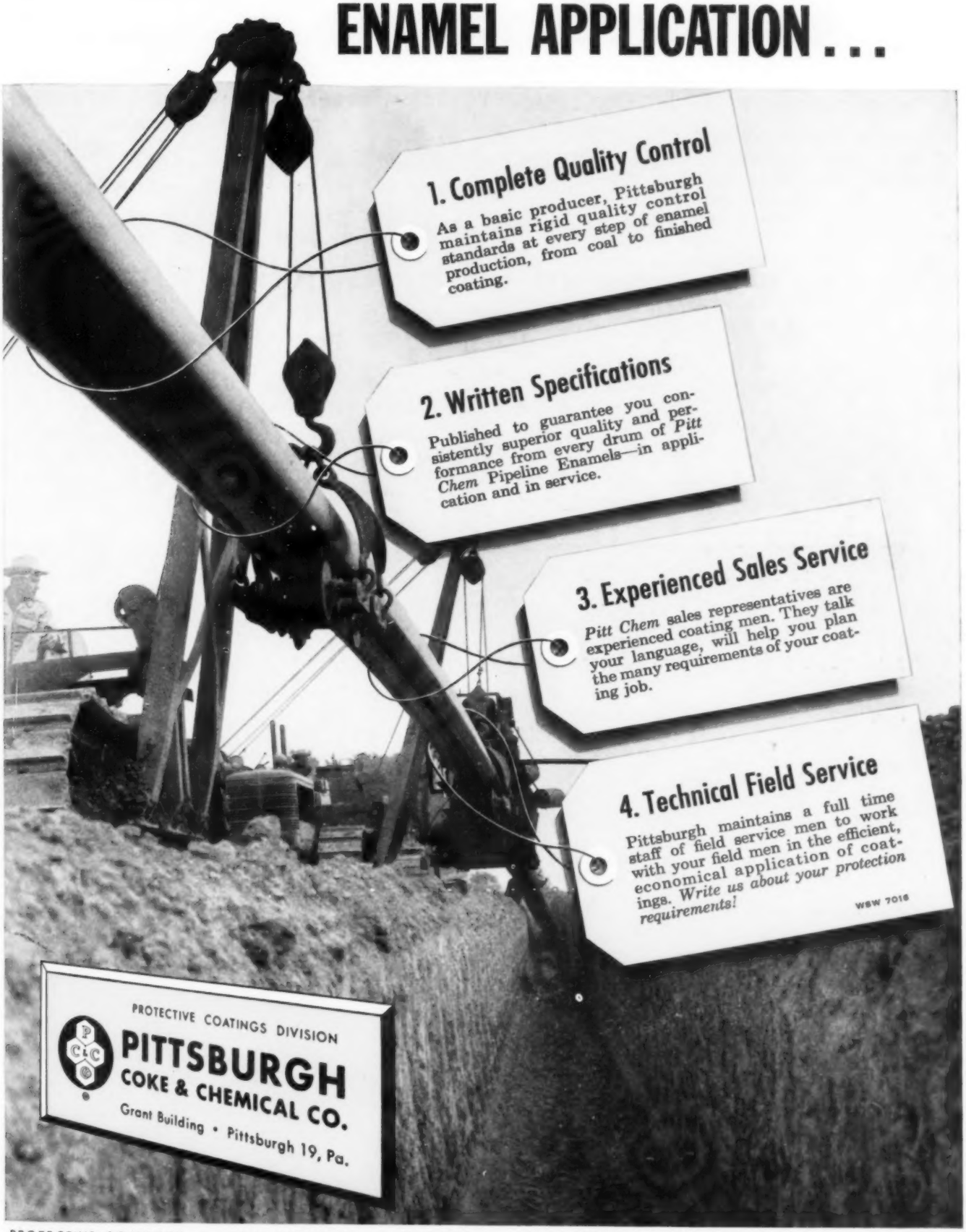
United States Steel Appoints Brooks El Paso Representative

Ben Brooks has been named El Paso city representative for United States Steel's Oil Well Supply division.

Brooks has been with U. S. Steel since 1948. In 1956 he was appointed field representative at Hobbs, N. M., where he was located prior to his present appointment.

PIPE LINE INDUSTRY's annual Editorial Index is available now. Use the Reader Service Card to order yours.

BEHIND EVERY PITT CHEM PIPELINE ENAMEL APPLICATION...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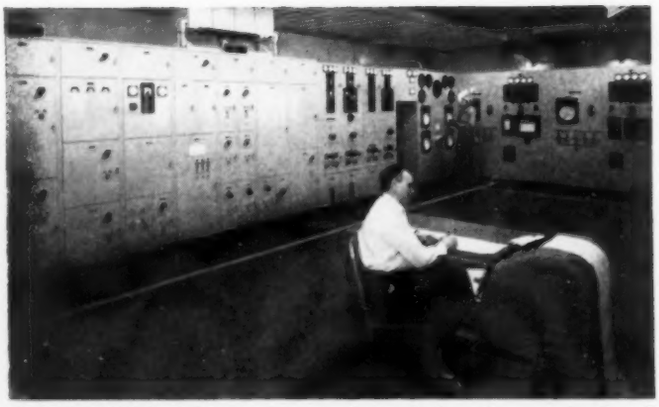
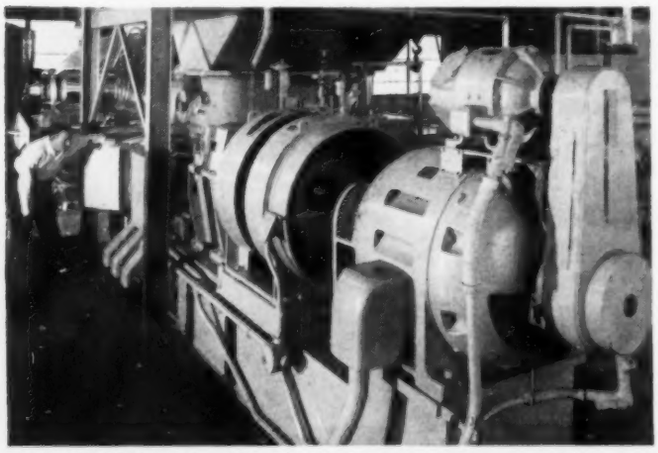
To keep pace with their increasing customer demands, El Paso Natural Gas Company completes 11th pumping station powered by General Electric gas turbine drives

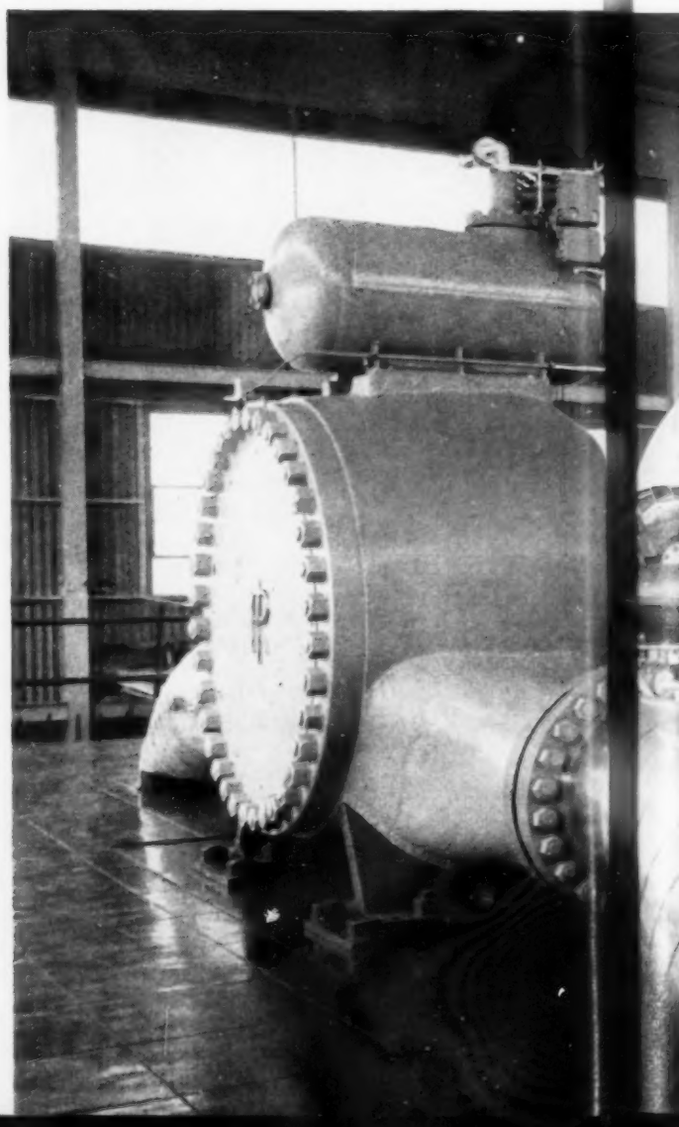
COMPACT GENERAL ELECTRIC GAS TURBINES can provide twice the horsepower of some other prime movers occupying the same floor space. This rotating gas turbine and centrifugal compressor provides smooth, quiet, operation. Installation and maintenance costs are low.



CENTRALIZED Cabinetrol control panels handle practically all auxiliary station functions from one convenient location. Centralized control saves operator time . . . cuts maintenance costs.



DEPENDABLE G-E Tri-Clad* AC Generator provides economical auxiliary power for Belen Station. Improved bearing system gives greater efficiency, longer life, reduced maintenance.



IN 1950, as a part of its continuing expansion program to meet growing demands for gas in the West, El Paso Natural Gas Company began the use of gas turbines for centrifugal compressor drives. The completion of Belen Turbine Station, near Belen, New Mexico, marks a recent step in the realization of their expansion plans.

Belen Station is the 11th EPNG facility to be equipped with General Electric gas turbine drives and centralized control systems. Performance records show that these rugged, compact G-E drives require very little maintenance, and afford substantial floor-space savings.

New, simplified General Electric turbine design eliminates the expense of maintaining a number of auxiliary pumps, blowers and associated equipment. Utilization of either full or semi-automatic control further reduces station operating costs.

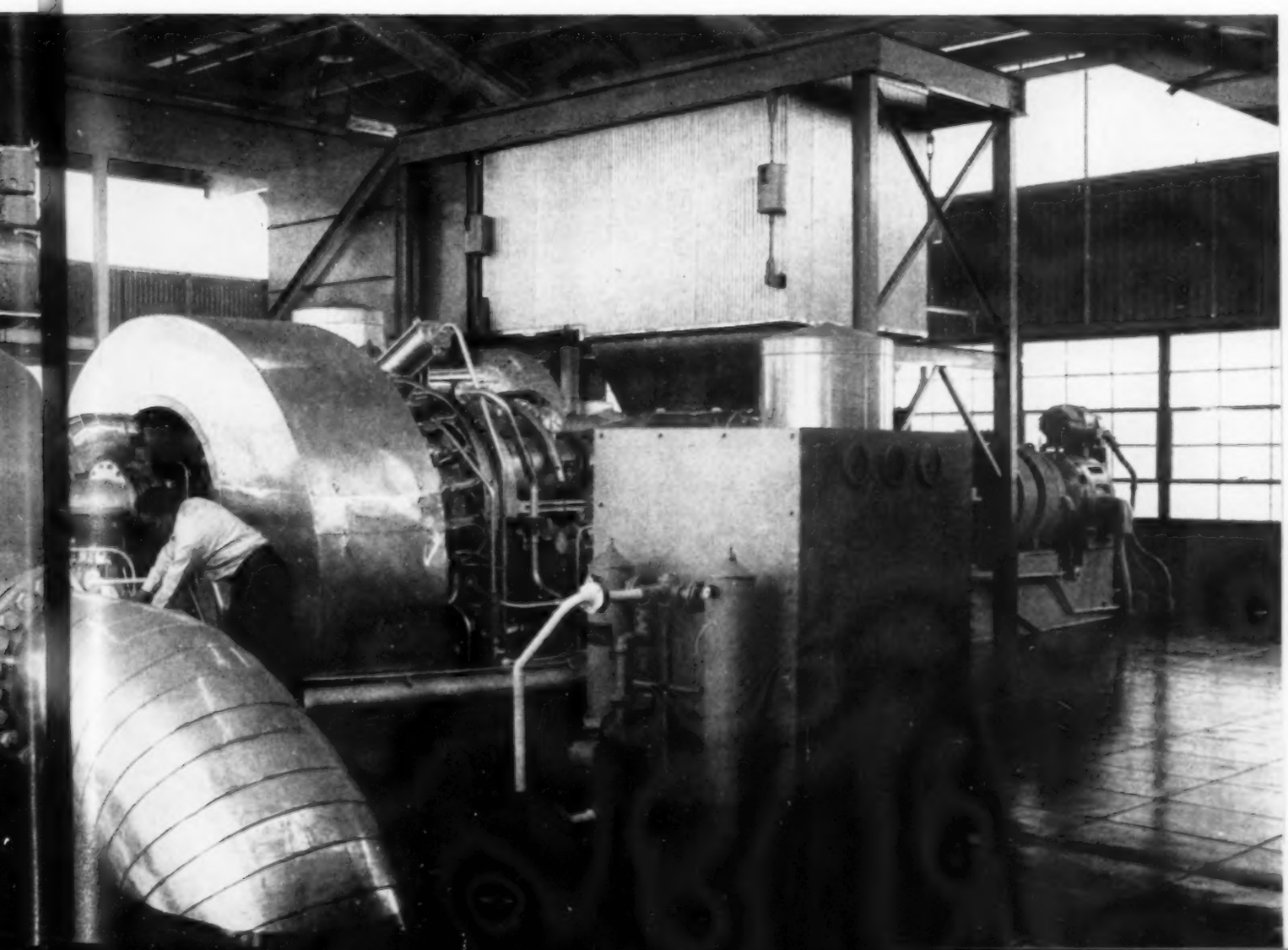
Pre-assembled G-E Cabinetrol* control panels help cut installation costs and centralize operation of auxiliary station functions. Because Cabinetrol control panels can be conveniently located in areas away from operating machinery, no expensive, specially protected equipment is necessary. In addition, the central location of control panels saves operator time and helps provide a neater station appearance.

General Electric offers complete engineering service to help you plan the drive system which best meets your gas-pipeline station requirements. Utilization of G-E's experienced system engineering staff can help you get your station in operation faster, with fewer problems, and with less expense. For complete information, contact your nearby General Electric Apparatus Sales Office. For full details on G-E gas turbines, write for free bulletin GED-3546, to General Electric Co., Section 662-51, Schenectady 5, N. Y.

* Reg. Trade-mark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Joe Czajkowski is Somerville's cost administrator

When you have Somerville on the job, Joe is the man to call about costs. He has been a part of our team for over 12 years and as our administrative vice president, he supervises an efficient staff of personnel in all our offices including estimating and billing departments. His accuracy and efficiency help us give you more dependable, business-like service.

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Charles George

Aubrey Jones

Gardner-Denver Company Announces Three Major Personnel Promotions

Gardner-Denver Company announces three major personnel changes. Charles M. George, secretary, has been elected vice president and general manager for operations; Aubrey H. Jones, vice president and director of the export division, has been named president of Gardner-Denver International, C.A., a new subsidiary; and Kenneth J. McDaniel, director of personnal, becomes secretary.

Kenneth McDaniel

George, who has been with the company 30 years, was named industrial sales manager in 1947, assistant to the president in 1954 and secretary in 1955. Jones has been with the company since 1927. He became Los Angeles district manager in 1934, director of export division in New York, 1947 and vice president in 1953. McDaniel joined the firm in 1947. He was appointed assistant controller in 1954 and director of personnel in 1954.

Charles Ashmun Heads Newly Formed Tank Terminals Co.

Buckeye Pipe Line Company and Chicago Bridge and Iron Company have formed a jointly owned firm called Buckeye Tank Terminals, Inc.

The new company will construct, own and operate terminal tankage on the Buckeye Pipe Line system, or at other locations. It also will lease or otherwise arrange for use of those facilities by a specified individual customer. Buckeye Tank Terminals is headed by Charles Ashmun, formerly assistant to the president of Buckeye Pipe Line Company.

Clark Bros. Co. Appoints John V. James Vice President

John V. James has been named vice president-finance for Clark Bros. Co., division of Dresser Industries.

James has been assistant comptroller for the past year. Since June of this year he served as financial assistant to the executive vice president with Clark. Before joining Dresser, James served in various accounting and administrative capacities with Corning Glass Company and Carr Consolidated Biscuit Company.

Dr. Carl E. Barnes Named Vice President

Dr. Carl E. Barnes has been elected vice president for research by Minnesota Mining & Manufacturing Co.

He will be responsible for all major research programs and policies. The company also announces that Dr. John W. Copenhaver has been named director of central research, a position formerly held by Barnes.

Barnes joined the firm in 1954 as central research director. Previously he had been director of research with Arnold, Hoffman & Co. Copenhaver was associate director for the M. W. Kellogg Co. from 1949 until 1957.

Clark Bros. F. H. Ford Named Gas Turbine Group Vice Chairman

F. H. Ford of Clark Bros. Co. was elected vice chairman of the Gas Turbine Group of the National Electrical Manufacturing Association at its 32nd annual meeting in Atlantic City. Ford is assistant manager of the Marketing Department, Turbines, of the company's Turbo Product division.

Ford has served the past 2 years on a committee of the group which supervises the writing of standard specifications for industrial gas turbines.

Warren W. Lee Appointed Eastern Region Sales Supervisor

Warren W. Lee has been appointed eastern region sales supervisor for systems engineering of Minneapolis-Honeywell Regulator Company's Brown Instruments division.

Lee joined Honeywell in 1950 and served in various capacities prior to his present assignment. He succeeds J. T. Teed, recently named petroleum instrumentation market manager.

CLASSIFIED ADVERTISING

SENIOR COMMUNICATIONS ENGINEER

Major pipe line company with offices in Midwest has need for qualified engineer experienced in both microwave and wire line communications. Must be familiar with all types of communication and related equipment and capable of design, cost estimating, and preparation of economic studies on new facilities or revision or expansion of existing facilities. Must be capable of writing and interpreting specifications for units of communication equipment or for communications system. Required to supervise communications study section, including dealing with other company groups or outside groups such as equipment suppliers or partners in jointly-owned systems.

Write, giving resume of education, experience, and qualifications, including picture and telephone number.

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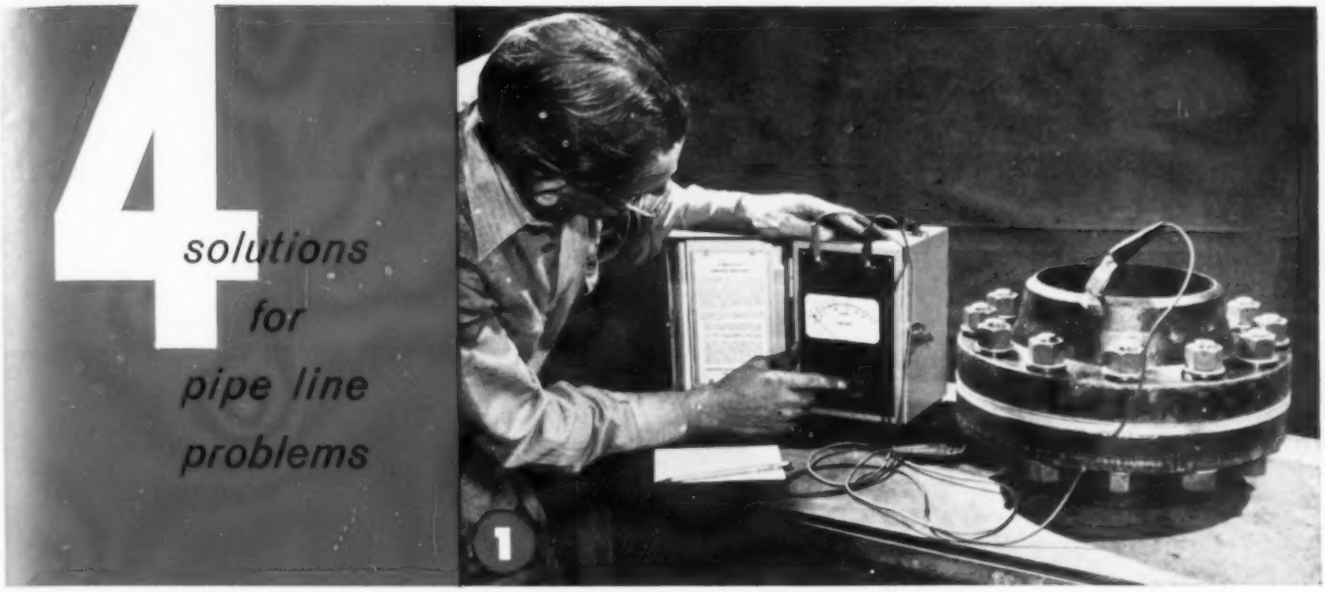
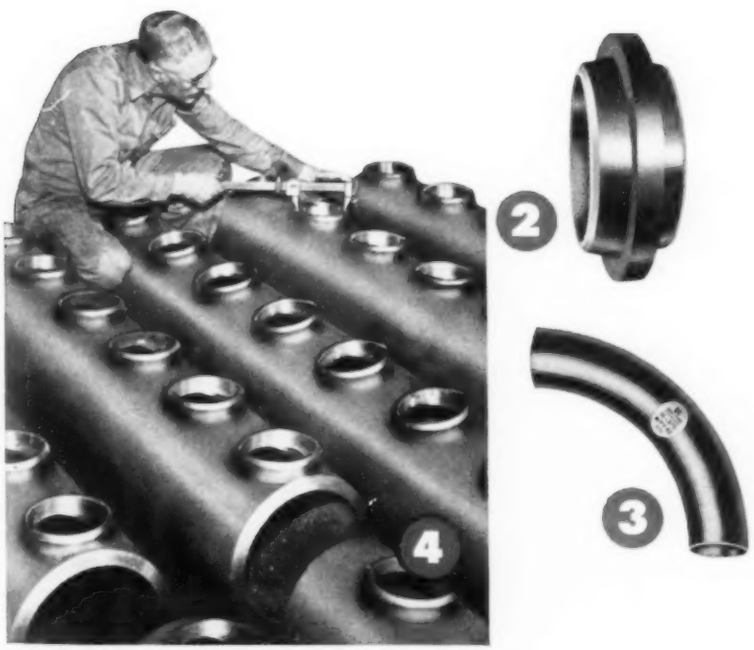
A NEW ANGLE ON PIPE LAY OUT. With one move on a new slide rule, read diagonal length and angle of cut. Figures "dog legs" braces, trusses—both angles and length of cut. SIMPLE—ANY ONE CAN USE. Takes the place of log tables in these computations $3.50 post paid. BIG MIDGET PRODUCTS, Dept. A, 2221 8th St., Lubbock, Texas.



TUBE-TURN® Welding Fittings and Flanges



1. Pipe Line Insulating Flanges help prevent corrosion by electrolytic action. Can be furnished completely assembled and tested for electrical resistance to insure optimum efficiency. Available in all sizes and materials to match your job.

2. Welding Neck Anchor Forgings provide best method of holding high pressure pipe lines immobile at river crossings, compressor stations, valve and meter settings, other spots where uncontrolled thrust forces could damage the system or equipment.

3. 3R Elbows improve flow conditions and provide free passage of "pigs" or other cleaning devices. Radius 3 times nominal pipe size. Available in 45°, 90°, or odd angles.

4. Manifold Welding Fittings are individually designed to meet specific applications and service conditions. Produced in any size, wall thickness, carbon steel or alloy—with any number of outlets.

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R. H. FULTON COUNTS ON CATERPILLAR SPREAD

Caterpillar MD7s move twin drills into position prior to blasting limestone. Crew bored to 60". Ditch is 54" deep and 32" wide.

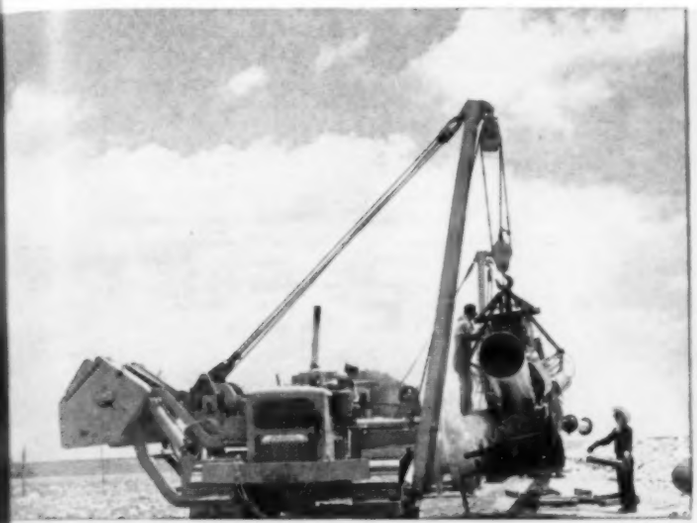
MD7 raises 40' length of 20" pipe for welding. In background, a big yellow D7 pulls a welder.

Cat DW20 Tractor with No. 456 LOWBOWL Scraper hauls fill to pad ditch. DW20s had "plenty of lugging power and speed," says supt.

There's a 20" pad of dirt over the line. Here a D8 with No. 8A Bulldozer does the backfilling to finish a section.

"We think Cat equipment is the best for long life and top production," sums up F. C. Talley, superintendent for this R. H. Fulton job. "And Caterpillar Dealer service is always dependable and they have good parts supplies."

TO SET 2-MILE-A-DAY PACE THROUGH LIMESTONE



For doping and wrapping, R. H. Fulton made good use of a Caterpillar No. 572 Pipelayer with its adjustable counterweights.

MD7s lower pipe into ditch. There is a 10″ pad of dirt beneath pipe to cushion it against rock.

D9 and two D8s on Fulton's all-Caterpillar team bulldoze extra rock into piles on line's right of way.

Caterpillar No. 12 Motor Grader does clean-up work along the right of way. Line is 117 miles long.

WHEN R. H. Fulton & Company started this 117-mile natural gas line from Ozona to Midland, Texas, everyone knew the going would be tough. Right of way for the 20″ line ran through a rough 65 miles of solid limestone.

These on-the-job photos show how an all-Caterpillar earthmoving and pipelining fleet helped this R. H. Fulton crew set a two-mile-a-day pace—despite limestone, heavy rains and high winds.

This is the kind of rough going Caterpillar equipment is designed for. Pipeline contractors all over the world know this. That's why you see so many big yellow machines wherever a line is being laid.

CATERPILLAR TRACTOR CO.

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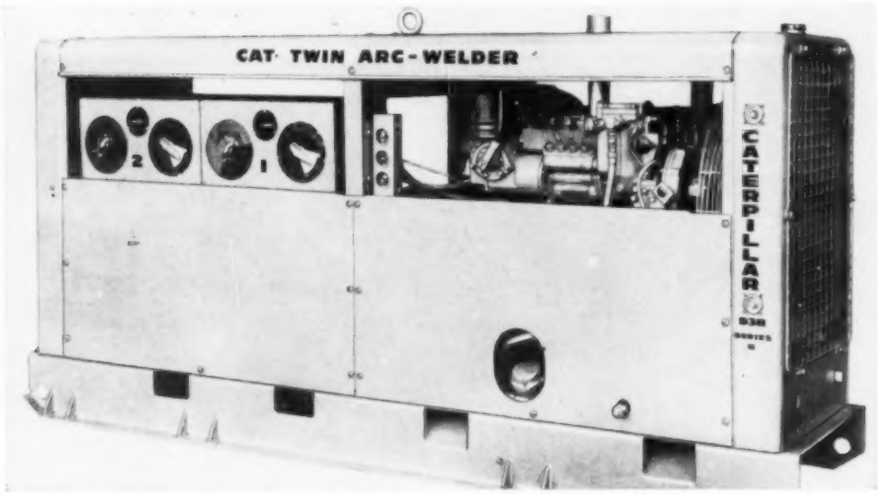
PEORIA, ILLINOIS, U. S. A.

What's New in EQUIPMENT



Mobile Twin Arc-Welder

Caterpillar Tractor Company's Engine Division announces development of a portable twin arc-welder equipped with either skid base or running gear. The welder uses a Cat D311 diesel engine and 2 Lincoln Electric welding generators. The generators have a rating of 300 amps at 40 volts for simultaneous operation of two arcs. For parallel operation the twin arc welder is rated at 600 amps, 40 volts. Current range of each generator is 60 to 375 amperes.

The unit is equipped with 2 sets of generator controls which allow welding at different voltages, amperages and polarity to permit precision adjustment for any type or size arc throughout the current range. Adequate engine reserve capacity assures a constant arc without fluctuation due to normal load variations.

(This item supplements Caterpillar Tractor Company data on pages 67-69 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E1** on Readers' Service Card, last page this issue.

Circuit-Breaker

General Electric Company announces a new circuit-breaker with a pushbutton reset feature which puts mobile radio systems back on the air instantly when main cable fuses fail.

The circuit-breaker eliminates need for replacement of fuses on the main power lead from a vehicle's battery to the radio set. Although designed to be used with radio equipment, the unit may be installed on other types of communication units with minor modifications of the mounting bracket.

(This item supplements General Electric Company data on Pages 181-188 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E3** on Readers' Service Card, last page this issue.

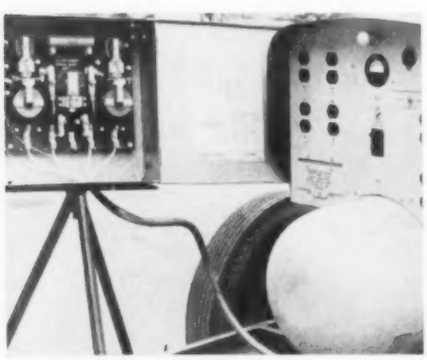
Electronic Control System

A new electronic system which will monitor and control operations of an oil field is being constructed by Bendix-Pacific, division of Bendix Aviation Corporation.

The system is based on digital-data-transmission and remote control concept that minimizes man-hours and accuracy problems in fields ranging from weather observations to oil storage.

It consists of 44 remote stations for reporting all malfunctions and controlling electric heaters used to heat pipe lines to prevent the high wax content of crude from congealing. The system will indicate alarms at any one of the 190 producing wells in the field. Stations will be connected to a central control station by a single pair of wires. Pulse tone "beeps" will automatically relay an alarm signal to indicate equipment failure. The master control station can interrogate each of the remote stations and quickly pinpoint the trouble. Routine question and answer sessions can be performed by Electro-Span at any desired interval.

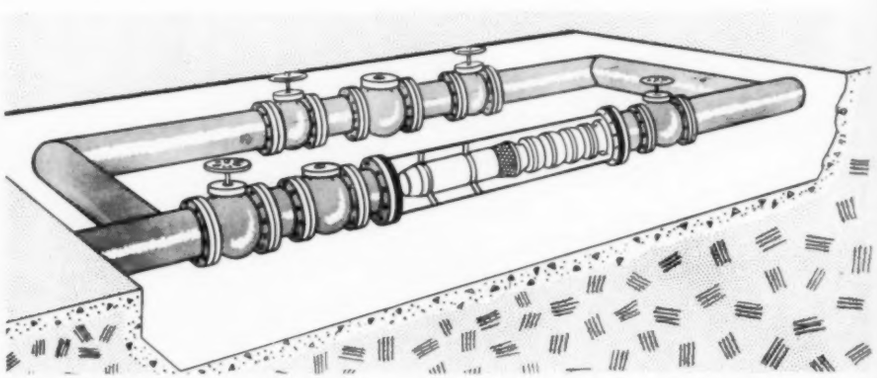
For more data, circle **No. E4** on Readers' Service Card, last page this issue.



Load Demand System

Pacific Mercury has developed an automatic load demand system, the FAC 200, for use with its electric plant models. The system automatically starts the electric plant when a load is switched on and turns power off when it is no longer needed. It also offers a complete emergency standby control system in case of power failure. When used this way, it takes over when necessary, shuts itself off upon restoration of utilities furnished power. The FAC 200 can be wall hung, or, for outside the plant use, mounted on a tripod alongside the electric plant.

For more data, circle **No. E2** on Readers' Service Card, last page this issue.



Submersible Line Pump

Layne & Bowler Pump Company has introduced a submersible pipe line booster pump which is designed to operate in a horizontal position within the pipe itself. The "power-line" design enables the pump to be suspended within a special section of the pipe line. This section is flanged at each end and becomes an integral segment of the line. The motor is centered and firmly held by special spiders within the section; the line liquid is drawn past the motor, into the bowl assembly, which passes it along at increased pressure. The power cable leads to a terminal box mounted outside the pump section and from there runs to a control box.

The pump unit provides noiseless operation, economy and dependability; it also eliminates need for pump hoses, motor damage from heat, dust and moisture, vandalism and all stuffingboxes or packing glands. It is built to operate within the pipe from 8 to 24-inches and gives capacities from 100 to 4,000 gpm in heads ranging from 50 to 500.

For more data, circle **No. E5** on Readers' Service Card, last page this issue.

here's important

new economy for you

in weed control...

UREABOR® weed killer is a dependable performer. It's effective, easy to apply, low in cost, and provides long residual action. Now, for as little as 30¢ per 100 sq. ft., you can control vegetation for a full year in areas like the one shown here.

Granular, dust-free UREABOR is applied at low rates in its delivered form... dry. There's no mixing... no water to haul... no need for cumbersome spray rigs... for it can be applied by hand. A specially designed spreader, which simplifies and speeds application, is available for treating large areas. It delivers low rates of UREABOR accurately and to best advantage.

UREABOR weed killer is safe—it is nonvolatile, nonflammable, noncorrosive and nonpoisonous when used as directed. It is economical and convenient; ready for use any time—dry. To learn more about new UREABOR weed killer, write today.

This new chemical can prove to be your most practical way of keeping any area weed-free

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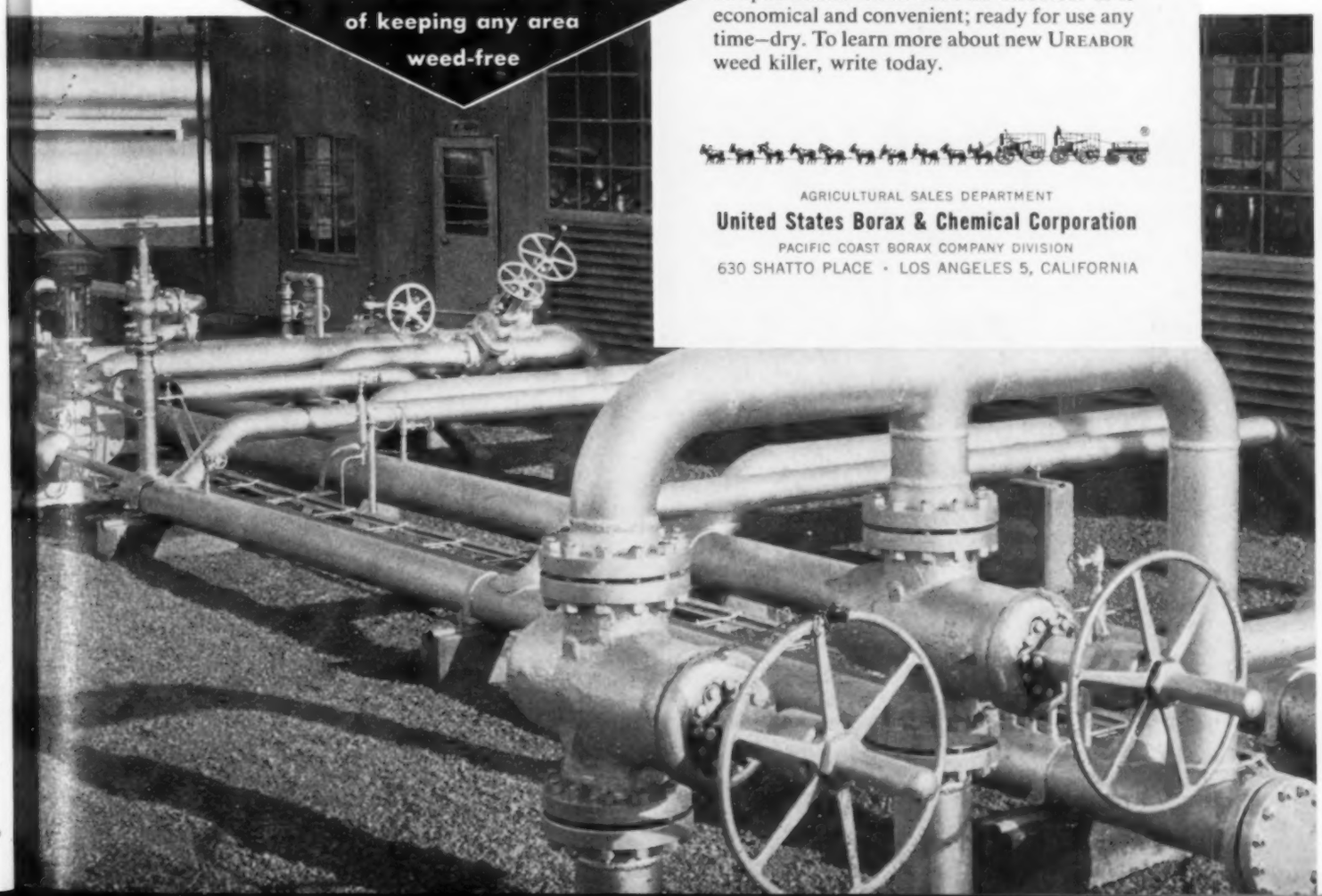

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FLEET-LINE®

WELDING FITTINGS

REDUCERS: Concentric and eccentric. Nominal pipe sizes 1" to 30", ASA B16.9, ASTM A234. Schedules 10 to 160, stainless steel, and other alloys. Special lengths and sizes.

SADDLES: Conventional, and for pressure vessel heads. Nozzle sizes from ¼" to 24". Fleet-Line saddles weld neatly into place in much less time, and with much less welding rod.

Complete encirclement saddles.

Fast interested service.
Write for Literature.

STEEL FORGINGS, Inc.

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Solenoid Valve

Magnetrol Valve Corporation presents a new line of explosion proof and splash proof solenoid valves. The line features normally opened and normally closed type valves for automatic or remote control of flow of gas, water, oil, solvents, etc.

Certain valves are made for specific hydraulic control application and others for specific control of air or gases under pressure or vacuum and also water or other liquids of various viscosities, not injurious to bronze.

Control circuits for the valve line may include flow or liquid level control, push button, pressure switch, limit control, thermostat and electronic relays.

(This item supplements Magnetrol data on pages 270-271 of the Pipe Line Composite Catalog, 1st Edition.)

For more data circle **No. E6** on Readers' Service Card, last page this issue.

Diesel Engines

International Harvester presents 4 new diesel models designated the UD-554, UD-370, UD-282 and UD-236.

The 6 cylinder 554 is rated 121 net horsepower at 1,800 rpm, and the 4 cylinder 370 has 80 net horsepower at same rpm. Increasing cylinder bores ⅛-inch through use of a new thin-wall, centrifugally-cast, replaceable sleeves provides increased power and faster heat dissipation to cooling water. Better oil control and improved power sealing for higher speed operations are provided by 5 piston rings, all located above the piston pin.

Both engines have many interchangeable parts including cylinder sleeves, pistons, connecting rods and injectors. The 282 and 236 are 6-cylinder, direct starting models. The 282 develops 85 net horsepower at 2,400 rpm, while the 236 develops 65 horsepower at the same rpm. The ability to operate continuously at 2,400 rpm makes these diesels useful for direct-connection to low-cost, high-capacity centrifugal pumps used for drainage and sprinkler irrigation. Features of these smaller motors include: replaceable, thin-wall hard-iron sleeves, counter balanced forged steel crankshaft, with torsional vibration damper for smooth running, compact fuel injection pump, 12-volt, direct electric starting with individual glow plugs in each pre-combustion chamber.

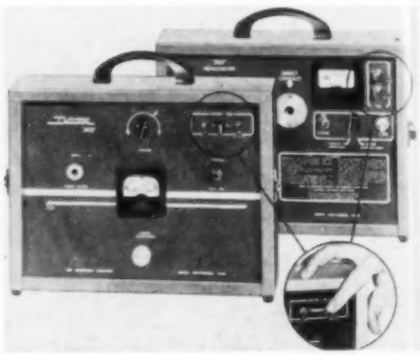
For more data, circle **No. E7** on Readers' Service Card, last page this issue.

Pipe Line Aftercoolers

A new line of pipe line aftercoolers designed to cover the range of conditions encountered in industrial air compressor service has been announced by American-Standard, Ross Heat Exchange Division.

This series, Type A-100, is standardized to eliminate engineering costs and delays involved in custom fabrication. An improved moisture separator employs centrifugal force to remove entrainment from the line. The aftercoolers are offered in 54 models with capacities specified for operating pressures up to 125 psig for single and two-stage compression.

For more data, circle **No. E8** on Readers' Service Card, last page this issue.



Pipe Line Detector

Designed to determine the exact number of pipes which may lie in the path of the bulldozer or ditching machine, the detectron pipe detector features a newly designed circuit and internal construction. Computer-Measurements Corporation's new detector produces a sharper signal which is more active. Two closely parallel pipes can now be detected independently; this improved accuracy reduces possibility of cutting unknown pipes.

The new circuit provides a more stable field signal, reducing possibility of false signals caused by static and minor changes in the mineral content of soil. With the increased sensitivity of the 505 circuit, fewer deep pipes will be missed which could later be cut by a ditcher.

For more data, circle **No. E9** on Readers' Service Card, last page this issue.

Choke Flow Control

Cosasco Division of Perfect Circle Corporation introduces a new type positive choke flow control employing the patented access fitting principle. The control eliminates bulky valves from oil production flow lines. There are no moving parts subjected to pressure, fluid distortion or wear and the choke beans can be changed under full operating pressure without system shutdown.

It can be used under all pressure and temperature conditions and has a rated working pressure of 10,000 psi. The plug or choke bean assembly is easily removed or replaced under full operating pressure. By replacing choke beans, production flow can be changed at will without shutting the system down.

For more data, circle **No. E10** on Readers' Service Card, last page this issue.

TEXAS EASTERN TRANSMISSION CORP.

SOUTHERN PACIFIC PIPE LINES, INC.

ARABIAN AMERICAN OIL CO.

EL PASO NATURAL GAS CO.

SERVICE PIPE LINE CO.

GULF INTERSTATE GAS CO.

NC NORWOOD CONTROLS

THEY PICKED ELECTROSYN

to measure and indicate operation pressures and flows, and for digital telemetering

Basic system consists of signal transmitter, magnetic servo amplifier, null-balance indicator. (No electron tubes, slide-wires or continuously moving parts.)

In measuring pressure the Model 501 transmitter utilizes a twisted bourdon tube as the pressure sensing element. This tube converts the pressure into shaft rotation of the ElectroSyn signal generator, a rotary differential transformer. The 8½-volt signal output from the ElectroSyn signal generator is an a-c voltage exactly proportional to the measured variable. Write for ElectroSyn Brochure B257 — **Norwood Controls Unit, Detroit Controls Division, 931 Washington St., Norwood, Mass.**

- Higher reliability
- Lower maintenance
- Flexibility of application
- Rugged electro-magnetic system
- Can withstand static overload of 300% of rated pressure for a 1% zero shift
- Remote transmission
- Explosion-proof transmitters

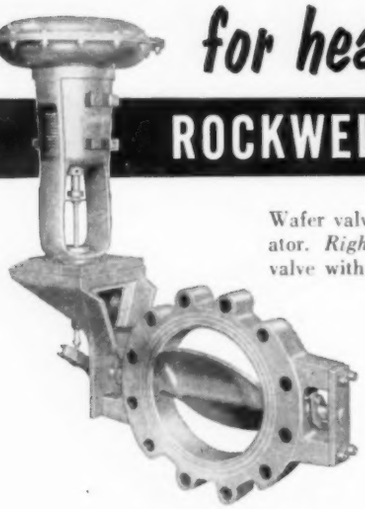
AMERICAN-Standard PRODUCTS

AMERICAN-Standard

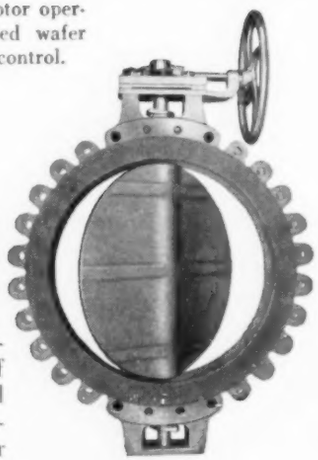
DETROIT CONTROLS DIVISION

for heavy duty service

ROCKWELL "WAFER" VALVES



Wafer valve with air motor operator. *Right* — rubber-lined wafer valve with hand wheel control.



Compact, space-saving butterfly valves for dependable throttling and wedge-tight shut-off of air, gas, liquids and semi-solids at differential pressure to 900 psi and higher and temperatures from minus 300° to 2000°F. Manual or automatic operators. Standard sizes to 36" and larger special sizes. Write for Bulletin 580.

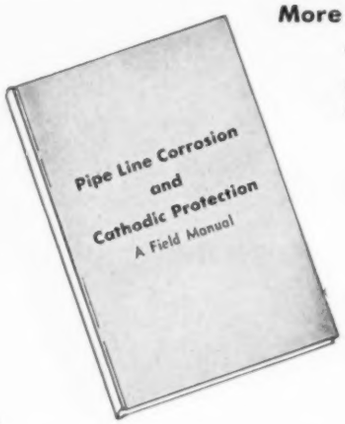
W. S. ROCKWELL COMPANY

2728 ELIOT STREET • FAIRFIELD, CONN.

Sales Representatives in Principal Cities

More comments on this new Handbook:

"... a most practical on-the-job manual for men concerned with pipe line corrosion. We are ordering copies for each of our district engineers."



Pipe Line Corrosion and Cathodic Protection

By MARSHALL E. PARKER

This Handbook, written by Marshall E. Parker, consultant, is designed as a practical field manual. It is a 108-page pocket-size volume printed first as a popular series in WORLD OIL. The Handbook is illustrated with many charts and drawings and is completely indexed by subjects.

It presents comprehensive data on Soil Resistivity Surveys, Potential Surveys, Line Currents, Current Requirements, Rectifier Systems, Ground Bed Design, Magnesium Anodes, Stray Current Electrolysis, Interference in Protective Systems, Operations and Maintenance, and Coating Protection and Testing.

An appendix has been added of technical data on Underground Corrosion, Basic Principles of Cathodic Protection, Properties of Metals and Attenuation Equations. Order copies of this practical Field Manual now for each of your field men. Price $3.

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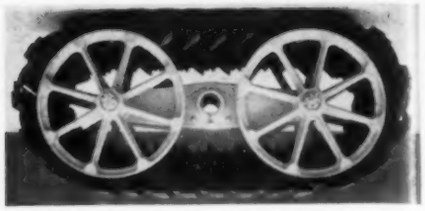

Trac-Wheels

M. J. Crose Manufacturing Company, Inc., announces a new track design, Trac-Wheels. The simplified track design reduces costs, has greater track bridge strength and wear resistance and a one-point lubrication system.

Already field proven on coating kettles and bending machines, the trac-wheels have shown important savings in operation of construction equipment. Installation of the wheels takes only 30 minutes.

(This item supplements M. J. Crose Manufacturing Co., Inc., data on pages 104-105 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E11** on Readers' Service Card, last page this issue.

Tapping Machine

T. D. Williamson, Inc., announces a dual purpose tapping machine, Model 100-C. The hand operated unit permits ½-inch to 2-inch hot taps through gate or plug valves into piping and tanks. Taps may be made on lines in service, pressures up to 1440 psi at 100° F., or temperatures up to 700° F at 700 psi.

It is designed to install scraper passage indicators and to install and remove gage adapters, thermometer wells, corrosion test and coupons without shutdown. A new gearing system allows the boring bar to be rotated without travel and extended without rotation. Other features include planetary gearing, which provides automatic drill feed and a selective clutch producing fast feed for advance and retraction.

For more data, circle **No. E12** on Readers' Service Card, last page this issue.

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YOUR MOST RELIABLE SOURCE FOR ELECTRIC WELD LINE PIPE*

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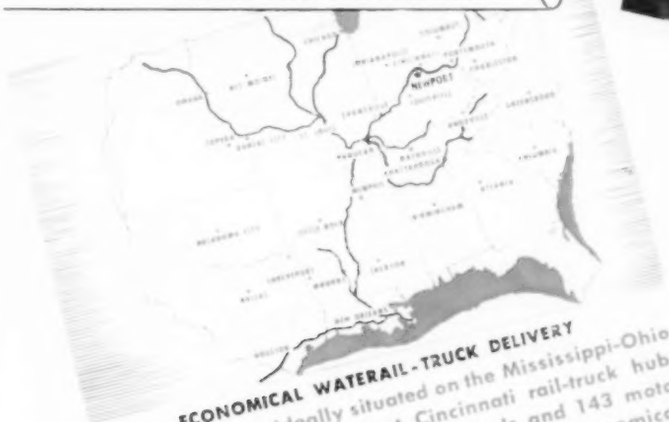

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This Company is ideally situated on the Mississippi-Ohio River system and the great Cincinnati rail-truck hub. New barge facilities, 7 major railroads and 143 motor carriers enable Acme-Newport to give economical, dependable delivery to the entire area of the Middle West and South.

Here is close control in every process, from steel melting, rolling and conditioning to actual pipe forming, straightening, sizing and beveling. Each length is hydrostatically tested to API and ASTM specifications to ensure uninterrupted service. All the qualities you demand for economical line pipe installation are available from Acme-Newport, where modern facilities and well-trained personnel blend with 73 years' steelmaking experience.

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	.142"	6.61
	.156"	7.25
	.188"	8.64
	.219"	10.00
	.237"	10.79
6⅝	.156"	10.78
	.188"	12.89
	.219"	14.97
	.250"	17.02
	.280"	18.97

Acme-Newport Steel COMPANY

NEWPORT, KENTUCKY

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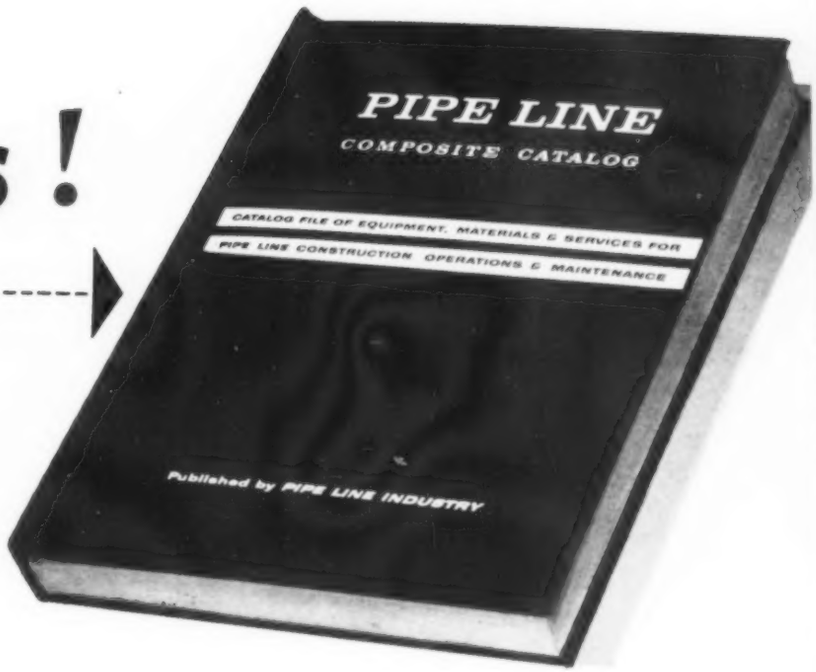
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PIPE LINE CONSTRUCTION, OPERATIONS & MAINTENANCE
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PIPE LINE COMPOSITE CATALOG

***Published by* PIPE LINE INDUSTRY**

Two-Way Radio

Motorola Inc., has developed a new two-way radio, which utilizes more than 20 transistors, half the size and using only 1/3 the power of ordinary units.

Along with the compact radiophone, Motorola announces its pocket sized transmitters and receivers. Main features of the new mobile unit are its increased reliability and low power drain characteristics.

The "Handi-Talkie" receiver and transmitter also make full use of transistors. Weighing less than four pounds and easily fastens to a belt, transmitter range varies from 1-10 or more miles, depending on the type of station being communicated with. Pocket units are especially useful for construction work, plant protection, fire work and many other jobs.

For more data, circle **No. E13** on Readers' Service Card, last page this issue.

Portable Power Plant

D. W. Onan & Sons Inc., has introduced a small gasoline-driven generating plant, which may be installed on a pick-up to supply power to operate a number of electrical tools in the field.

In a recent field job, the portable plant furnished power for weld testing along the right-of-way. It operated a ¾-horsepower grinder, portable hand grinder and electric drill in addition to a number of 2,000-watt portable floodlights.

With this tool, a welder's performance can be checked at job site to speed construction work.

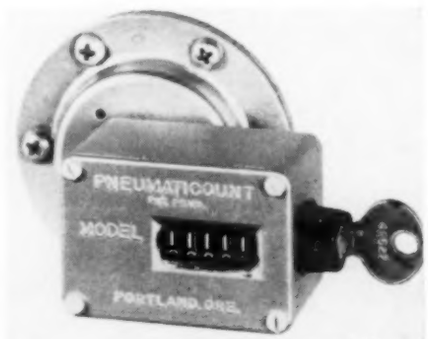
For more data circle **No. E14** on Readers' Service Card, last page this issue.

Iron Powder Electrode

Lincoln Electric has announced a new electrode, Mangjet, to reduce the cost and provide easier operation in welding 12-14 percent manganese steels. It is suitable for building up manganese steel hardsurfacing deposits on either manganese or carbon steels and also for making sound joints between 2 manganese steel parts or between manganese and carbon steel.

It is used for both AC and DC welding and deposits a greater amount of weld metal per electrode as non-iron powder electrodes.

For more data, circle **No. E15** on Readers' Service Card, last page this issue.



Automatic Counting Device

Especially adapted as metering devices for automatic lease custody transfer units, Pneumaticount's automatic counting units are available for immediate delivery.

The highly accurate counters screw into the line controlling the air cylinder and can be installed in five minutes. Designed for field use, with tamper-proof key reset and weather proof cases, the counters are built for long wear and accurate performance. Models are available from 1 to 5,000 pounds and up to 300 counts per minute; all models are available with 5 or 6 digits.

For more data, circle **No. E16** on Readers' Service Card, last page this issue.

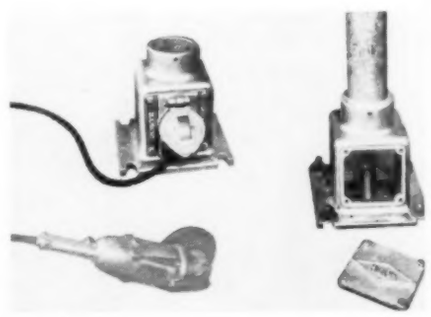
Centrifugal Pumps

Homelite, division of Textron Inc., announces three new pumps, the 300 series. The self priming, centrifugal pumps, having a capacity of 18,000 gallons per hour, are designed for all-purpose use by contractors, builders and industrial plants.

The model 8 engine starts quickly even in cold, wet weather. The two-cycle engine has few moving parts and is easy and inexpensive to maintain. Self cleaning construction permits handling of muddy and sandy water without clogging. All models will pump and prime at 28 feet above water level.

(This item supplements Homelite data on pages 224-225 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E17** on Readers' Service Card, last page this issue.



Metal Pipe Base

Hope Electrical Products Co., announces a metal pipe base which serves as a support for pipe for various lighting and signs. The metal base, which has its own junction box accessible through an opening at the front, can be installed by the company's maintenance crews.

The product is available with a receptacle, with weatherproof cover, which provides easy electrical plug-in for power tools, equipment and auxiliary lighting.

For more data, circle **No. E18** on Readers' Service Card, last page this issue.

Phosphor Bronze Brushes

The Anderson Corporation announces a complete range of phosphor bronze wire brushes for use in applications where sparks may be dangerous or undesirable.

The phosphor bronze wire, by eliminating sparking and static electricity, is ideal for use in areas where the atmosphere may contain explosive dust or gases as well as where gasoline or other explosive material may be present.

Brushes are available in 4-inch and 6-inch cup type, medium and wide face wheel type and both straight and bent handle hand scratch type. In addition, styles for special application can be supplied to suit individual requirements.

For more data, circle **No. E19** on Readers' Service Card, last page this issue.

New Equipment Literature

For more data on New Equipment or copies of Catalogs and Literature reviewed in this issue, use the Reader Service postcards just inside the back cover and facing the Advertisers Index. Simply circle code numbers of items desired—sign and mail card.

Backhoe-Loader

J. I. Case Company announces an eight-page, three-color bulletin describing and illustrating the 42 horsepower utility model 310B wheel-mounted backhoe-loader.

Presented in the booklet are 35 operating advantages of the "matched" trenching-loading machine plus details of the backhoe, loader, and heavy-duty tractor. Action views of the rig working under various conditions are included.

To get a copy, circle **No. E20** on Readers' Service Card, last page this issue.

Plant Operations Manual

The Natural Gasoline Association of America recently published a plant operations test manual containing a collection of over 80 test methods widely used in the control of gas processing plants.

The manual, designed as a convenient, one-stop library of test methods, brings together tests from many widely scattered sources.

To get a copy, circle **No. E21** on Readers' Service Card, last page this issue.

Flexring Coupling

John Waldron Corporation announces the availability of Bulletin 61 on flexring coupling.

The illustrated flier includes diagrams and tables on the flexring which comes in 4 sizes for light horsepower applications up to 1,000 rpm.

To get a copy, circle **No. E22** on Readers' Service Card, last page this issue.

Truck-Mounted

Thew Shovel Company offers a 12-page catalog describing its Lorain 107, 7-8 ton truck-mounted crane, convertible to shovel, dragline, clamshell and hoe.

The booklet lists features of the crane such as hydraulic controls, open, uncluttered design, lavish use of anti-friction bearings, precision boom lowering device square-tubular-chord crane.

To get a copy, circle **No. E23** on Readers' Service Card, last page this issue.

Corrosion Control

Fibreglass Limited offers an eight-page bulletin and several data sheets on the use of fibreglass wrap for corrosion control of buried pipes.

The booklet explains causes of corrosion of pipe and presents advantages of its product for protection. The illustrated bulletin includes sections on product specifications, applications of wrap and field performances.

To get a copy, circle **No. E24** on Readers' Service Card, last page this issue.

Tandem Welding

A four-page bulletin describing the advantages of multiple electrode submerged arc tandem welding has been published by Lincoln Electric Company.

Tandem welding employs two or more separate arcs operating in close proximity, one behind the other, on the same weld bead. The illustrated bulletin explains the process in detail, presents information on the application opportunities and requirements with tandem welding and outlines commonly used equipment arrangements.

To get a copy, circle **No. E25** on Readers' Service Card, last page this issue.

Gas Turbines

Clark Bros. Co., has published an illustrated bulletin giving details on operating experience with the Mark TA 750/1000 kw gas turbine. Design features, types of fuels (natural gas, distillate, crude oil) and applications in oil fields and process industries are thoroughly discussed.

Also included is an assessment of the integrated turbine—boiler package and likely future trends in turbine application.

To get a copy, circle **No. E26** on Readers' Service Card, last page this issue.

LACT Installations

Ralph N. Brodie Company has assembled a technical data folder as an aid to evaluating and planning lease automatic custody transfer installations.

Highly illustrated with photographs and drawings, it includes specially prepared schematics of complete LACT metering units and various bulletins describing Brodie positive displacement meters, strainers, automatic control valves and other specialized equipment.

To get a copy, circle **No. E27** on Readers' Service Card, last page this issue.

Pressure Vessel Design

The American Car and Foundry division of ACF Industries, Inc., has published a guide that eliminates need for lengthy computations in design of pressure vessels. The booklet was developed to enable engineers to determine simply and quickly the size of a pressure vessel where the maximum working pressure requirement and desired capacity or space limitations are known.

The manual outlines in 5 basic steps the procedures to follow in determining size of the vessel once the basic requirements are determined. It contains tables giving head capacity and shell capacity per linear inch for various tank sizes.

To get a copy, circle **No. E28** on Readers' Service Card, last page this issue.

For More Dependable Equipment and Service

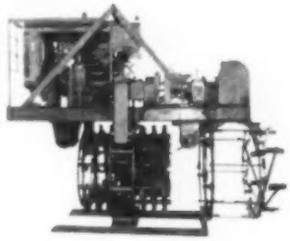
Specify

MYOCO

CLEANING and PRIMING MACHINE

The MYOCO Cleaning and Priming Machines are available in sizes 3" thru 36". Pictured here is the 26"-32" size with two counter-rotating heads featuring the special MYOCO design counter-rotating gear box.

It is powered by an International U-9 self-starting engine and uses the Ramsey transmission. Engine exhaust is utilized to heat primer tank.



COATING and WRAPPING MACHINE

The MYOCO Coating and Wrapping Machine is powered by an International gasoline engine, with electric starter, spray type shoes, and heavy-duty transmissions and clutches. This new machine features under-pressure-crawler wheels equipped with hydraulic cylinder to maintain positive contact, easily controlled by the operator.

When you use MYOCO pipeline equipment, you quickly find that servicemen are experienced and available twenty-four hours a day with fast transportation available to serve you in any way; efficient equipment operation is assured by periodical checks; and if possible, parts and supplies are shipped the same day ordered.

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The Editorial Index is now at the printers and soon will be ready for distribution. The 1958 Editorial Index provides a time-saving entry into all 12 issues of PIPE LINE INDUSTRY published in 1958.

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☐ 1958 Editorial Index

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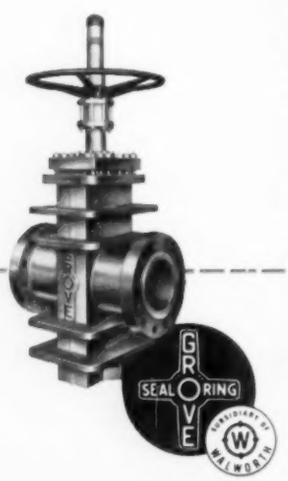
You're never stuck with a GROVE VALVE



Here's the valve you set and forget. Grove's exclusive Seal-O-Rings wipe out the need for valve lubrication. You're never stuck with valve failure because of forgotten lubricant or depleted sealing compound. The load of lubrication is gone forever. Specify Grove Seal-O-Ring Gate Valves. Under pressure the tightest seal in the line.

Grove valves never require lubrication

GROVE VALVE & REGULATOR COMPANY

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